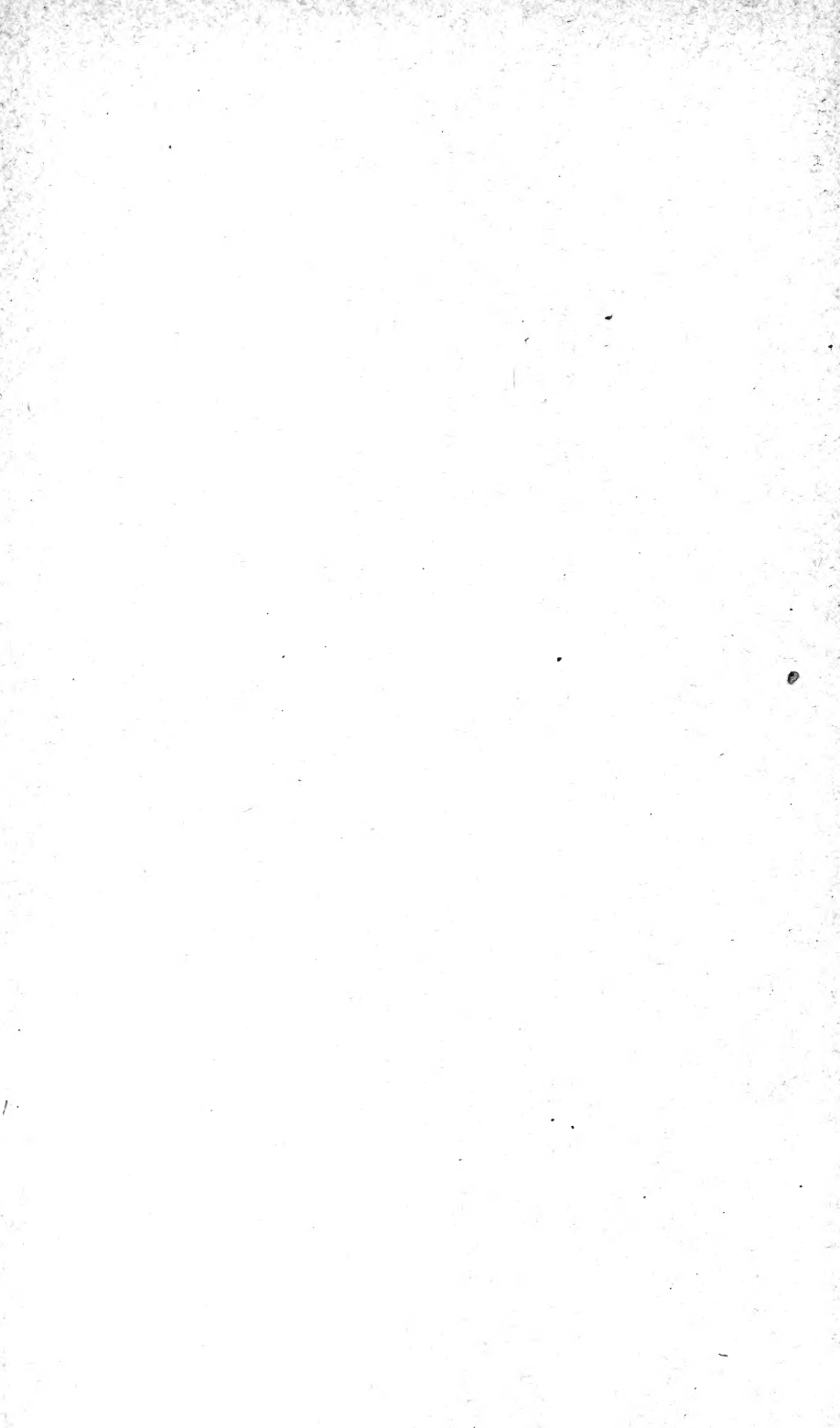




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The Annals

OF

Scottish Natural History

A QUARTERLY MAGAZINE

WITH WHICH IS INCORPORATED

"The Scottish Naturalist"

EDITED BY

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1900



EDINBURGH

DAVID DOUGLAS, CASTLE STREET

LONDON: R. H. PORTER, 7 PRINCES ST., CAVENDISH SQUARE

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The Annals of Scottish Natural History

No. 33]

1900

[JANUARY

A FEW NOTES ON THE WORKING OF THE WILD BIRDS PROTECTION ACT (1894)

By WILLIAM BERRY, B.A., LL.B.

THE Wild Birds Protection Act of 1894 has now been in operation within one district of Fifeshire for three complete seasons. Even after such a short period as this, though great results cannot yet be looked for, some distinct effect and improvement are already to be seen ; and it may be interesting, such as they are, to have them recorded in the 'Annals.'

The district referred to lies in the north-east of the county, and is known as the 'Tentsmuir' ; about a third of it has been under the writer's pretty constant supervision since the autumn of 1890. For some time before that this moor, which is naturally very attractive to many species of wild birds, had not been sufficiently watched or protected, and in the absence of this had become a happy hunting-ground for egg-gatherers, who regularly searched it for eggs, and gathered every egg they could find. Most of the eggs were doubtless boiled for food if fairly fresh, or thrown away and destroyed if much incubated, though the egg-gatherers as a class are not very fastidious ; but boxes were also regularly despatched by rail to collectors and dealers in

London and elsewhere. Of course the results of such practices as these could not but be injurious; and, in fact, they were too easily seen. The Common Terns seemed to be able to hold their own in spite of any amount of persecution, and Sheldrakes were more numerous than was to have been expected, but all other species were distinctly scarce. There were a few Curlews and Golden Plovers struggling for existence, a certain number of Lapwings, and on the northern 'third' perhaps five or six pairs of Eiders; but most of the nests were plundered one by one, and of the Eiders in particular very few were ever able to hatch.

Moreover, there was little that could then be done to remedy this state of matters, though whatever could be done was done; but neither force nor argument are of much use where there is not legal support in reserve behind them. After a year or two of continual watching, some little improvement was indeed perceptible; a certain percentage of Eider Ducks were now able to hatch out successfully, and the Terns perhaps increased in numbers; but the improvement was too slight to permit of great hopes being entertained of anything like a satisfactory result being attainable. Such improvement as there was, was only secured at the cost of very much uphill work.

Such was the state of matters in 1894, when at length an Act was passed which gave a little legal backing to those who were interested in the protection of nesting wild birds; and Tentsmuir, which is an isolated and sparsely inhabited tract lying within a highly populous district, seemed an exceptionally suitable spot in which to test its efficacy. To bring the Act into operation there, it was necessary to secure the assistance of the County Council; and there ensued a lengthy correspondence with the County Authorities, firstly, to satisfy certain members of the Council that no valuable interest was in conflict with that of Wild Bird Protection, and thereafter, as to the form in which a Protecting Order should be drawn up, even such details as the Latinity of the scientific nomenclature to be adopted being fully discussed. However, in time all objectors were won over, the piloting of the matter through its various stages in the Council being kindly undertaken by Sir Ralph Anstruther, Bart., and an

application to the Secretary for Scotland was in due time sent in. An Order was then issued, on the 7th of January 1897, placing Tentsmuir under the operation of the Act for five years from the following month of March.

The writer, who had the advantage of the suggestions and advice of the editors of this magazine, drew up a list of birds to be protected under the Act, which list was that eventually adopted. His desire was to see included under the prohibition the eggs of all birds which bred, or which were likely to breed, on the moor, excepting only those of birds noxious to agriculture, or so common as to require no protection; but the eggs of one or two rather improbable breeders which happened to resemble those of more common birds were also included in the list, in order to obviate as far as possible the necessity for skilled evidence in the course of any legal proceedings which might have to be taken should any contraventions of the Order be reported.

On the whole these efforts were well rewarded; for at the close of the succeeding breeding season there was quite a different story to tell. Formerly neither force, argument, nor persuasion were of much avail; but now, to all who did go to the moor for the purpose of gathering eggs, the appearance of a watcher or gamekeeper was the signal of general flight. There were, however, comparatively few who attempted to defy the law. Even up to the present time only one serious case has been reported, namely, on 20th June 1898, when two labourers from Tayport were found with eighty-one Terns' eggs in their possession. These men were charged before the Sheriff at Cupar, and were fined £1:4s. each; but the other two or three trivial contraventions which have been discovered were all committed in ignorance, and in their case a verbal reminder of the existence of the Act was all that was called for.

In 1898 the Secretary for Scotland proposed to all the County Councils in the country that the protection of wild birds and their nests and eggs should be undertaken, under their auspices, in something like a systematic and methodical manner; and two short but sufficiently comprehensive lists of the birds which it was deemed advisable to favour with the protection afforded by the various Acts were at the same

time drawn up, one list being applicable to the North and the other to the South of Scotland. The disadvantages of having, perhaps, totally different groups of birds protected within adjacent counties having practically the same physical configuration were sufficiently conspicuous ; and the County Council of Fife, among others, adopted Lord Balfour's scheme, with the relative schedule of birds applicable to the southern half of Scotland. The adoption of this plan involved the repeal of the Tentsmuir Order of the previous year, with its very much longer list of protected birds ; but the General Order does all that is required, as well for Tentsmuir as for the rest of the county ; though, as it may be hoped that our breeding lists will be extended as the universal system of egg-gathering hitherto in vogue is gradually checked, it might be well to add to the lists from time to time any new birds whose claims to protection may emerge. Already, in fact, the addition of the Pintail to our list is emphatically called for ; and the Arctic Tern, which the writer would have liked to see included in the original list, might be added at the same time. But if the lists are thus subject to occasional revision, great things may be hoped from this well-considered scheme. The Act, however, when it has been adopted, must be properly supported and enforced, and not permitted to become a dead letter in the district ; without support and assistance from game preservers and land-owners generally, its power for good will be much restricted.

On the northern 'third' of Tentsmuir, where the Act has been thus backed up, there has been an undoubted improvement. Several Eider Ducks' nests may now be found, without difficulty, where one was to be found before ; and of those found this year, all but two, which were destroyed by the heavy rainfall, were successfully hatched. Golden Plovers have been more numerous this summer than they have been for years ; moreover, they all left the moor soon after the middle of July, instead of lingering on into August as they would probably have done had even the earlier eggs been gathered. This year it was the early eggs that were hatched, and long before August both young and old had gone elsewhere. Ducks of two or three kinds nested in most unusual numbers, and among them was at least one pair of Shovellers

—a bird, so far as the writer's experience goes, quite new as a breeder on Tentsmuir.

While the Act of 1894 has thus proved itself to be of much value and efficacy, there are one or two points where, in scope or in working, it may be extended and improved. A little is yet wanted to enable those of us who have no sympathy with what sometimes passes for 'oology' nowadays, to check its ill effects. Great sympathy may indeed be felt with egg-collecting where the collecting is done by the collector himself, and done, as it quite well may be done, so as to cause inappreciable harm to the birds themselves ; but with the taking of entire clutches of eggs, or, worse and worse, of several clutches of eggs of the same bird, the writer at least has absolutely no sympathy at all. No scientific purpose would seem to be served ; indeed, practically all that can be known about British oology is known already ; and for purposes of research large, if not complete, collections can be studied in the museums which exist in most of the chief towns in the kingdom. Certainly the pleasure of searching for and finding the nest of a new bird is great, and when the nest has been found it can do little or no harm if one or two of the eggs are taken—taken, perhaps, more as a memento than as specimens of great scientific value ; but surely the rest of the clutch might be left alone to hatch in peace, so that the pleasure of searching for several nests of the same kind (and of leaving them undisturbed when found !) may be enjoyed during succeeding years.

While, however, with personal egg-collecting it is perhaps unnecessary, as it would certainly be difficult, for the Legislature to interfere, there is another method of egg-collecting, carried on in another way altogether, of which it is hard to speak in measured terms. This system is as follows :—A, a dealer in some large town, sends out circulars broadcast, offering to pay cash down for eggs of almost any kind, whether they are 'protected' under the Wild Birds Acts, or 'game' within the meaning of the Poaching Prevention Acts, or unfortunately not protected at all. There is much reason to fear that there is generally B, a malefactor ready to fulfil A's requirements to the letter. Presumably there is somewhere or other a C who considers himself a 'collector,' and

who is ready to pay A a still larger sum for his ill-gotten plunder. A clause in a new Wild Birds Act which would render it an offence for any one, either from within a protected area, or from outside it, to solicit the taking of eggs of protected birds there, might do something to check what is at present a serious and a growing evil, while over the interference with the nefarious system in all its branches it would only be possible to exult. It is earnestly to be hoped that when the whole matter comes to be reconsidered in the light of a few years' experience of the working of the present Act, this point may be taken up and dealt with.

The expense entailed, under the terms of the present Act, on any community which takes steps to put it in operation is another matter which might be considered. The provisions of the Act itself are as follows:—

SECTION 4.—(1) The Council of an administrative county shall in every year give public notice of any Order under this Act which is in force in any place within their county during the three weeks preceding the commencement of the period of the year during which the Order operates.

(2) Public notice under this Section shall be given—

- (a) As regards each place in which an Order operates, by advertising the order in two local newspapers circulating in or near that place;
- (b) By fixing notices of the Order in conspicuous spots within and near each place in which the Order operates; and
- (c) In such other manner as the Secretary of State may direct, or as the Council may think expedient, with a view to making the Order known to the public.

The result of these provisions is that the whole text of every Order issued by the Secretary for Scotland in terms of the Act, with all its lists and schedules, has not only to be inserted *in extenso* in the advertisement columns of two newspapers several times over; it must also be printed on posters and exhibited on notice boards, 'in conspicuous places within or near each place in which the Order operates,' during three whole weeks in each year. The cost of erecting the notice boards (and of replacing those of them which were defaced or broken up by presumably aggrieved egg-stealers) must

have amounted to quite a considerable sum in the case of the Tentsmuir Order alone ; and undoubtedly this is an item of expense which many Councils may be glad to avoid incurring, by the simple expedient of leaving the Act severely alone. Might it not, therefore, be sufficient for the County Authorities to be directed merely to promulgate the Order by means of handbills displayed in the windows of police stations 'within or near' the protected area, or in some such simple way? The saving in expense would be considerable, and would be all in favour of our cause.

It is also to be hoped that the Legislature will at the same time increase the penalty—as it may be, the ridiculously inadequate penalty—which is all that can at present be imposed on an offender convicted of a contravention of any of the Wild Birds Acts. Under certain circumstances a very small fine may be all that is called for ; but if anything is to be done to curb the marauding instincts of professional egg-dealers or of ignorant men with guns, both the transgressor himself, and also any person who has solicited, or being his employer has knowingly permitted him to do the wrongful act, must be liable to a penalty much heavier than the present maximum of £1 per egg taken or per bird destroyed ; and, as a matter of course, any eggs found in the possession of an accused person, or the skins of birds he has killed, should in every case be confiscated as a necessary consequence of the conviction. There are too many men whom it is scarcely possible to persuade not to shoot every unusual but interesting or beautiful bird they come across ; and there are gamekeepers who not only shoot down Owls and Buzzards, Woodpeckers and Jays, without a shadow of remorse, but who are encouraged by their employers to do so. One would fain hope such men are less numerous than they were ; but, be they many or few, may it soon be within one's power to bring to bear upon them a force more persuasive than argument.

THE FISHES OF THE FIRTH OF FORTH AND
ITS TRIBUTARIES: SPECIES ADDED SINCE
DR. PARNELL'S 'ESSAY' OF 1837.

By WILLIAM EAGLE CLARKE, F.L.S.

DR. PARNELL'S Prize Essay 'On the Natural and Economical History of the Fishes, Marine, Fluvial, and Lacustrine, of the River District of the Firth of Forth' was contributed to the "Memoirs of the Wernerian Natural History Society" in the year 1837, and forms the bulk (pp. 161-520, and pls. xviii.-lxiv.) of vol. vii. of the series published in 1838.

It remains to this day one of the most important contributions to British faunal Ichthyology. Even in other than its local aspects it still possesses considerable value, for Dr. Parnell's careful original descriptions of numerous species may yet be consulted with advantage.

Since Parnell's day no one seems to have made a special study of the Fishes of the Forth. This is greatly to be regretted, for much remains to be accomplished. It is true that the Fishery Board for Scotland has conducted a series of most valuable and interesting investigations and experiments on the Forth and its Fishes; but these have naturally been chiefly made in the furtherance of their economic aspects, though the purely faunal side has not been neglected, and that such is the case will be manifest in what follows.

The object of this contribution is to gather together the widely-scattered records of the past sixty years which relate to such species as are additions to Dr. Parnell's List. In preparing this paper I have thought it best to give the details relating to the various occurrences as concisely as possible, and to give full references for all the published records.

I have been fortunate enough to obtain privately some additional information of importance, and in this connection I have to tender my thanks and acknowledgments to my friends Mr. Thomas Scott, Naturalist to the Fishery Board for Scotland, and Mr. William Evans. No doubt some records have escaped me, and a notice of such would form a welcome contribution to this magazine. It was not my

intention to have published on this subject at present, but Ichthyology is not well represented in our pages, and, as an opportunity arose, I availed myself of it.

The Firth of Forth is here considered to be bounded on the east by a line drawn from St. Abb's Head (outside the Isle of May) to Fife Ness, and agrees with the area defined by Dr. Parnell.

Dr. Parnell's List included 112 species,—as we now know them,—and this contribution adds 28, making a grand total of 140 species to date.

SEBASTES NORWEGICUS (*Ascanius*).

TRAQUAIR, "Proc. Roy. Phys. Soc. Edin.," vol. x. p. 509 (1891).

There is no record for this northern deep-water form within the somewhat shallow waters of the Firth. The Bergylt is, however, occasionally captured outside the Isle of May, and a specimen obtained there was exhibited by Dr. Traquair (*l.c.*) at the meeting of the Royal Physical Society on the 19th of March 1890.

SCORPÆNA DACTYLOPTERA, *Delaroche*.

SCOTT, "Ann. Scot. Nat. Hist.," 1894, p. 181.

In 1894 Mr. Thomas Scott submitted to me a specimen which had been captured by a Granton trawler to the south-east of the Isle of May on the 22nd of March of that year. Mr. Scott (*l.c.*) also records another example taken 17 miles north-east of Dunbar, on the 30th of April 1894. Neither specimen was full grown.

This fish is common in deep water in the Mediterranean and the North Atlantic as far north as Tromsøe. It was not added to the British fauna until the year 1889, when one was obtained off the south-west coast of Ireland; but it was not detected in British waters proper until 1893, when a specimen was taken on the Yorkshire coast (see Eagle Clarke, "Proc. Roy. Phys. Soc. Edin.," vol. xii. pp. 94-101, pl. xii., 1894). It has since proved to be not uncommon in certain deeps in the Moray Firth.

TRIGLOPS MURRAYI, *Günther*.

EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1895, p. 23.

Murray's Gurnard is one of the most interesting additions to the fauna of the Firth of Forth. A specimen, 5 inches in length, was submitted to me by Mr. Thomas Scott, which had been captured

by him to the west of the Isle of May on the 28th of November 1890.

It is a somewhat rare fish, and its distribution is peculiar, since it appears to be entirely confined to Scottish seas, wherein it was discovered by Sir John Murray in 1885.

TRACHINUS DRACO, *Linnaeus*.

GRAY, "Zoologist," 1849, p. 2519; FULTON, "Rep. Fish. Board Scot.," 1889, part iii. p. 356 (1890); SCOTT, "Ann. Scot. Nat. Hist.," 1893, p. 253.

It is rather remarkable that the Greater Weaver should be such an uncommon species in the Firth of Forth, for it is quite the reverse at St. Andrews, where it is described as frequent after storms; and it is not rare on the Scandinavian coasts.

It was first recorded for the Firth by the late Mr. Robert Gray (*l.c.*), who obtained a specimen near to the Bass Rock on the 14th of August 1848.

It was next captured—so far as we know—at Largo Bay in May 1889 by Mr. Scott, as mentioned by Dr. Wemyss Fulton (*l.c.*). Mr. Scott also took one, 12 inches long, in a shrimp-trawl in the 'Fluke Hole,' off St. Monance, on the 29th of August 1895 (Fulton, *l.c.*)

Lastly, so far as the Firth proper is concerned, an example was reported to me as having been captured, on a hand-line baited with mussel, off Craighleith at the beginning of July 1899.

It is also occasionally captured by the trawlers outside the May Island and off St. Abb's Head.

ORCYNUS THYNNUS (*Linnaeus*).

JAMESON, "Proc. Roy. Phys. Soc. Edin.," vol. ii. p. 16 (1863); M'INTOSH, "Rep. Fish. Board Scot.," 1885, App., pp. 206-207, pl. viii. (1886); MASTERMAN, *op. cit.*, 1893, part iii. pp. 273-283, pls. xi. and xii. (1894).

A specimen of the Tunny, 8 feet long, which had been captured in Aberlady Bay, was exhibited by Professor Jameson at the meeting of the Royal Physical Society on the 28th of April 1842, and is the first Forth record known to me.

A fine male, 9 feet long and weighing $6\frac{3}{4}$ cwts., was caught in a trawl in the 'Fraith,' off Pittenweem, in October 1885, as recorded by Professor M'Intosh (*l.c.*). The skeleton of this specimen was described in detail by Mr. Masterman (*l.c.*), and its characters and anatomy by Professor M'Intosh ("Ann. and Mag. Nat. Hist." (5), vol. xvii. pp. 236-337, pl. xi.).

CAPROS APER (*Linnaeus*).

TRAQUAIR, "Proc. Roy. Phys. Soc. Edin.," vol. x. p. 506 (1891).

A specimen of the Boar-fish, recently captured near the Isle of May, was exhibited at a meeting of the Royal Physical Society, on the 20th of February 1889, by Dr. Traquair. Another example was obtained in the following year, also taken off May Island.

GOBIUS PAGANELLUS, *Gmelin*.

GÜNTHER, "Catalogue of Fishes," vol. iii. p. 53 (1861).

Dr. Günther tells us that there is a half-grown specimen in the collection of fishes in the British Museum from the Firth of Forth. It would be both interesting and useful to obtain some further information regarding this fish as a native of the Forth.

APHIA PELLUCIDA (*Nardo*).

GÜNTHER, "Catalogue of Fishes," vol. iii. p. 80 (1861).

Dr. Günther (*l.c.*), under the name of *Latrunculus albus*, gives the Firth of Forth as a habitat of the Slender or White Goby, and mentions that there are three examples from the Firth in the national collection in the British Museum.

My friend Mr. William Evans informs me that at the beginning of August 1896 he observed a number of small Gobies in deep pools at the east limit of Aberlady Bay, and that he believed them to belong to this species.

This is another Goby about which it is highly desirable we should obtain further information as a Forth species. Dr. Day ("British and Irish Fishes," vol. i. p. 171) says that he obtained specimens at Aberdeen.

LIPARIS MONTAGUI (*Donovan*).

EVANS, "Ann. Scot. Nat. Hist.," p. 255 (1897).

In August 1897, Mr. William Evans found Montagu's Sucker on three occasions in rock-pools at North Berwick. Here they concealed themselves among the fronds of *Laminaria digitalis* growing round the margins of the pools, and could only be detected on the closest inspection. The specimens captured were from 2 to 2.5 inches in length.

This species is probably not uncommon in the littoral waters of the Firth. Professor M'Intosh ("Marine Fauna of St. Andrews," p. 175) says that it is abundant in the rock-pools at St. Andrews.

BLENNIUS GATTORUGINE, *Bloch.*

GÜNTHER, "Catalogue of Fishes," vol. iii. p. 213 (1861).

According to Dr. Günther (*l.c.*), there are five adult mounted examples of the Gattoruginous Blenny in the British Museum collection from the Firth of Forth.

This is yet another species about which it is most desirable we should have further information. It is said to have been captured on two occasions at Banff by Edward.

CARELOPHUS ASCANII (*Walbaum*).

FULTON, "Rep. Fish. Board Scot.," 1889, part. iii. p. 357 (1890);
EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1895, p. 24.

Dr. Wemyss Fulton (*l.c.*) records an example of Yarrell's Blenny, 5.5 inches long, which was caught on a baited line two miles off the mouth of the Tyne on the 13th of September 1889.

A specimen 7.5 inches long was brought to me on the 9th of August 1894. It had just been captured off Craighleith on rocky ground in 10 fathoms, and had taken a hook baited with mussel.

Mr. Evans tells me that he took one from a rock-pool at North Berwick in January 1896.

Professor M'Intosh ("Marine Fauna of St. Andrews," p. 175) says it is not uncommon in deep water, and occasionally in the stomach of the Cod.

LUMPENUS LAMPETRIFORMIS (*Walbaum*).

DAY, "Proc. Zool. Soc.," 1884, pp. 445-447, pl. xli., and "Rep. Fish. Board Scot.," 1883, App., p. 78, pl. x. (1884); SCOTT, *op. cit.* 1888, part iii. p. 326 (1889); FULTON, *op. cit.* 1889, part iii. p. 357 (1890); M'INTOSH, *op. cit.* 1893, part iii. pp. 225-227, pl. iii. fig. 2 (1894); EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1895, pp. 25, 26.

This Blenny was described as new to the British fauna by Dr. Day (*l.c.*), from a specimen captured 15 miles off St. Abb's Head in May 1884. It was taken in a trawl in 40 fathoms of water, and was sent to him by Professor M'Intosh.

In 1887 Mr. Scott (*l.c.*) found specimens on several occasions in the stomachs of Cod trawled in the Firth, but failed to identify them owing to their mutilated condition. In the following year, however, he took eight specimens in a shrimp-net, when trawling a few miles east of Inchkeith. Since then there are several records (Eagle Clarke, *l.c.*), and the fish seems to have thoroughly established itself in the deeper waters of the Firth.

TRACHYPTERUS ARCTICUS (*Brünnich*).

REID, "Ann. and Mag. Nat. Hist." (2), vol. iii. pp. 456-477,
pl. xvi. (1849).

A specimen of this deep-sea form, known as the Deal-fish or Vaagmaer, was cast ashore dead, but in a perfectly fresh condition, at Elie, early in April 1848. It was received on the 7th of that month by Professor Reid of St. Andrews, to whom it was sent by Dr. John Berwick of Elie. The specimen measured 5 ft. 4 ins. 'from the point of nose to termination of the vertebral column,' extreme height of body 11 inches. This appears to be the only specimen that has ever been obtained in or near the Firth of Forth, and it afforded Professor Reid material for a long and exhaustive account of a very remarkable fish. He was wrong, however, in his surmise that this example was the first that had been found in the British seas, for it had previously been recorded from Orkney several times, first in 1817, and from the Moray Firth in 1847.

REGALECUS BANKSII (*Cuv. and Val.*).

Mr. James Marr, harbour-master, North Berwick, informs me that, some fifty-five or sixty years ago, a specimen of Banks's Oar-fish was found by his brother, awash among the waves, on the east shore at that town. Mr. Marr remembers the occurrence well, and described the fish and its long-produced first dorsal rays with accuracy. The specimen, which was about 15 feet in length, was, Mr. Marr informs me, sold by his brother for £5 to Mr. Muirhead, fishmonger, Edinburgh.

No account of the occurrence of this rare and interesting abyssal form on the shores of the Firth appears to have been contributed to the scientific press of the period, at least I have as yet been unable to find such a reference. As the fish was exhibited to the public, however, some account of it may have found its way into the newspapers. I should be glad to learn of any such references if known to any of our readers.

GADUS MINUTUS, *Linnaeus*.

REP. MARINE ZOOL. COMM., "Proc. Roy. Phys. Soc. Edin.," vol. ii. p. 443 (1863); EWART, *ibid.* vol. viii. p. 273 (1885); FULTON, "Rep. Fish. Board Scot.," 1890, part iii. p. 92 (1891); EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1895, p. 26.

The Power Cod was added to the fauna of the Firth of Forth through the investigations of the Marine Zoology Committee of the Royal Physical Society in 1863, but without detailed particulars.

On the 19th of March 1884 Professor Ewart (*loc. cit.*) exhibited a

specimen at the meeting of the Royal Physical Society which had been recently taken off Eyemouth.

One 7 inches long was captured by the 'Garland,' whilst trawling west of the Isle of May, on the 17th of December 1890, as recorded by Dr. Wemyss Fulton (*l.c.*); and another, 4.18 inches, was taken in the same station on the 29th of April the same year (Eagle Clarke, *l.c.*). My friend Mr. Miles Johnson showed me an example, 6.35 inches long, which he had captured with rod and line, baiting with mussel, off the Bass Rock, in 12 fathoms of water, on the 2nd of August 1899.

Mr. Scott informs me that it occurs above Queensferry, but it is not a common species in the Firth, and that it is confined to moderately deep water.

Fertilised ova were obtained off the Bell Rock in June 1891, and it is said to be common at St. Andrews.

PHYCIS BLENNOIDES (*Brünnich*).

SCOTT, "Rep. Fish. Board. Scot.," 1888, part iii. p. 326 (1889).

Mr. Scott (*l.c.*) records the capture of a Greater Forked Beard off St. Monance, remarking that there did not seem to be any previous record for the Firth of Forth. This specimen was taken with beam-trawl in February 1888.

Mr. E. E. Prince, now Inspector of Fisheries, Dominion of Canada, however, writing in the "Scotsman" of 5th March 1887, says that this fish is 'not uncommon off the mouth of the Firth. Occasionally fine specimens are stranded at St. Andrews.'

ARNOGLOSSUS MEGASTOMA (*Donovan*).

EWART and MAITLAND, "Rep. Fish. Board Scot.," 1886, App., p. 63 (1887); SCOTT, *op. cit.* 1888, part. iii. pp. 325-326 (1889).

In their account of the "Fish taken by the 'Garland,'" Messrs. Ewart and Maitland (*l.c.*) mention a Sail Fluke (*A. megastoma*) of medium size, trawled at Station VI. (off Pittenweem, 10-15 fathoms) on the 15th of September 1886. Mr. Scott (*l.c.*) records 'a few specimens inside May Island and near Fidra [in 1888]. This species is not recorded by Dr. Parnell in his "Fishes of the Firth of Forth," and is probably not very common in the estuary.'

SOLEA LUTEA (*Risso*).

REP. MARINE. ZOOL. COMM., "Proc. Roy. Phys. Soc. Edin.,"
vol. ii. p. 240 (1863).

Under the name of *Monochirus lingulatus*, the Marine Zoological Committee of the Royal Physical Society records four Solenettes

dredged in the Firth on the 28th of September 1860, and describes them as new to the fauna of the Firth.

There are, to my knowledge, no other records for this species in the area under consideration. Messrs. M'Intosh and Masterman, however, procured the eggs of this species in St. Andrews Bay in May and July 1890 ("British Marine Food Fishes," p. 396, 1897).

THYMALLUS VULGARIS, *Nilsson*.

EVANS, "Ann. Scot. Nat. Hist.," 1892, p. 271.

Mr. William Evans (*l.c.*) tells us that the Grayling was introduced into Cobbinshaw Loch about fifteen years prior to 1892.

LEUCISCUS VULGARIS (*Linnaeus*).

EVANS, "Ann. Scot. Nat. Hist.," 1892, p. 270.

Mr. Evans (*l.c.*) records the introduction of the Dace into Linlithgow Loch in 1883, and describes them as being abundant there in 1892.

TINCA VULGARIS, *Cuvier*.

DAY, "British and Irish Fishes," vol. ii. p. 191 (1883).

Dr. Day (*l.c.*) informs us that "a few are found near Edinburgh." My friend Mr. William Evans tells me that the ponds in Gosford Park, East Lothian, hold Tench.

ENGRAULIS ENCRASICHOLUS (*Linnaeus*).

FULTON, "Rep. Fish. Board Scot.," 1889, part iii. p. 351 (1890).

In winter of 1889-90 Anchovies were captured at several localities on the Scottish coasts. The data obtained through the inquiries instituted by the Fishery Board enabled Dr. Wemyss Fulton to record (*l.c.*) the following information relating to the Firth of Forth:—

One crew of Anstruther herring-fishermen were certain that they had caught some Anchovies among herrings in the Firth (off the Fifeshire coast) at the end of December 1889; and one, five inches in length, was detected by the Fishery Officer among herrings landed at Dunbar on the 22nd of January 1890.

NEROPHIS LUMBRICIFORMIS (*Yarrell*).

EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1895, p. 27.

A specimen of the Worm Pipe-fish, captured by me under a stone, between tide-marks, at North Berwick on the 20th of August 1894, appears to be the only example of the species recorded for the Forth fauna.

CARCHARIAS GLAUCUS (*Linnaeus*).

EVANS, "Ann. Scot. Nat. Hist.," 1898, p. 239.

A Blue Shark, 10 feet long, was, according to the "Edinburgh Evening Dispatch," captured on Kinghorn beach on the 30th of November 1894.

One captured in the salmon-nets at Gullane Point, East Lothian, on the 7th of July 1898, was examined and recorded by Mr. Wm. Evans (*l.c.*).

This species is probably more frequent in its visits to the Forth than our present knowledge might warrant us to believe.

It is mentioned as not uncommon at St. Andrews; captured in the salmon-nets (M'Intosh).

ALOPIAS VULPES (*Gmelin*).

HAMILTON, "Nat. Lib. Brit. Fishes," vol. ii. p. 313 (1843).

A fine specimen of the Fox-Shark was exhibited, at a meeting of Wernerian Society, which had been captured in Largo Bay in August 1842 (Hamilton, *l.c.*).

A second example of this rare visitor to the waters of the Forth is recorded by Mr. Stirton in the present number of the "Annals." It was strangled in a salmon-net in Roome Bay, Crail, on 29th of August 1899, and measured 13 feet 10.5 inches in length.

LÆMARGUS MICROCEPHALUS (*Bloch*).

BROWN, "Zoologist," 1860, p. 6861; REP. ZOOL. COMM., "Proc. Roy. Phys. Soc. Edin.," vol. ii. p. 445 (1863); BROOK, "Rep. Fish. Board Soc.," 1885, App., p. 227 (1886).

Dr. Robert Brown (*l.c.*) records the first Greenland Shark for the Firth of Forth—an example 10 feet long, captured on the 5th of May 1859.

This specimen, perhaps, is the one alluded to in the Report of the Marine Zoology Committee of the Royal Physical Society (*l.c.*), wherein it is stated that 'about three years since, in May, one was caught near Inchkeith, and is now in the University Museum.'

Mr. George Brook (*l.c.*) recorded a young female, 5 feet in length, captured in the Firth on the 2nd of February 1886.

Mr. William Evans informs me that a male, about 5 feet long, was exhibited in Mr. Anderson's (fishmonger) shop, Edinburgh, which had been taken off the Isle of May on the 16th of December 1889; and that another was cast up west of the mouth of the Tyne on the 17th of February 1895.

ECHINORHINUS SPINOSUS (*Gmelin*).

DUNS, "Rep. Brit. Assoc.," 1871, p. 132; TURNER, "Journ. Anat. Phys.," 1875, p. 297 and figs.

The Rev. Professor Duns communicated to the Edinburgh Meeting of the British Association, in August 1871, a "Notice of Two Specimens of *Echinorhinus spinosus* taken in the Firth of Forth." Unfortunately, the mere title of the paper is given in the Report.

Sir William Turner (*l.c.*), however, alludes to these specimens as having been captured at Bo'ness and off Elie respectively, and mentions that the specimens are preserved in the Museums of Science and Art and of the Free Church College, Edinburgh. Sir William further remarks that Professor Duns was the first naturalist to determine the presence of this species in Scottish seas.

A third example,—a female,—6 feet 6 inches in length, was captured on lines with a herring bait, near the Bass Rock, in June 1874, and came into the possession of Sir William Turner, who figured and described it (*l.c.*) in detail.

MYXINE GLUTINOSA, *Linnaeus*.

GÜNTHER, "Catalogue of Fishes," vol. viii. pp. 510, 511 (1870).

DAY, "British and Irish Fishes," vol. ii. p. 365.

There is an adult specimen in the British Museum collection presented by — Woodfall, Esq. (Günther, *l.c.*).

Dr. Day (*l.c.*) informs us, on the authority of Goodsir, that the Glutinous Hag or Borer is found in the Firth of Forth. I have not yet been able to trace Goodsir's original record for this species as a Forth fish. Mr. C. W. Peach obtained a Forth specimen in March 1877; and Mr. William Evans informs me that the late Mr. F. M. Balfour obtained it at Dunbar.

ON THE OCCURRENCE OF THE FOX-SHARK
IN THE FIRTH OF FORTH.

By JOHN STIRTON.

ON the evening of the 27th of August 1899, a Fox-Shark (*Alopias vulpes*) was found strangled in the salmon-nets in Roome Bay, Crail, by Alexander Clark, salmon-fisher, and his crew. The fish had rolled the net round its gill-openings in such a manner as to suffocate itself, and this without damaging the net in any way. I saw it the next morning, and took the photograph of it now reproduced. I

also measured the specimen, with the following results : Length from snout to tip of tail, in a straight line, 13 feet 10½ inches ; length of tail, 6 feet 11 inches ; colour, light bluish slate ; sex, male ; pupil of eye elongated.



[The only previous occurrence in the Firth of Forth known to us is that of a "fine specimen" captured in Largo Bay in August 1842 ("Nat. Lib. Brit. Fishes," ii. p. 313).—EDS.]

DIPTERA SCOTICA : II.—INVERNESS-SHIRE.

By PERCY H. GRIMSHAW, F.E.S.

THE remarks made by me in the first two paragraphs of the first paper of this series ("Annals," 1899, pp. 84-85) will apply equally to the present contribution. In presenting this second instalment, I would again draw attention to the great paucity of information concerning the distribution of Diptera in Scotland, this being especially shown forth by the fact that I have been unable to find, after careful search,

more than a *single* record referring to the present county, although I have examined the more important entomological and other magazines from the years 1831 to 1899 inclusive ! The record in question is that referring to the Gall-midge, *Hormomyia juniperina*, L. Galls of this species on branches of the common juniper were exhibited by Professor Thomas King at a meeting of the Glasgow Natural History Society on the 30th September 1890, and were stated to have been obtained at Boat of Garten.

For the present list of 173 species I am much indebted to my friends Mr. Wm. Evans, Mr. L. W. Hinxman, Mr. Wm. Eagle Clarke, the Rev. E. N. Bloomfield, and above all, Lieut.-Col. J. W. Yerbury, to all of whom I here tender my grateful thanks. The interesting and well-preserved collections formed by the last-named gentleman form indeed the "backbone" of the present contribution, and I am glad to have the present opportunity of publicly acknowledging the debt under which he has placed me through his great generosity. All the specimens mentioned in the present paper under his name have been presented by him to the Edinburgh Museum, and hence have been examined by me. Since the list was made up, a further consignment, containing many interesting additions, has been received from the same source, and these will form a valuable supplement to be published later.

Family BIBIONIDÆ.

1. BIBIO POMONÆ, *Fab.*—Rothiemurchus, September-October 1894 (Hinxman); Nethy Bridge, August 1898 (Yerbury).

Family CULICIDÆ.

2. CULEX PIPIENS, *L.*—Inverdrue, May 1895 (Clarke).

Family PTYCHOPTERIDÆ.

3. PTYCHOPTERA SCUTELLARIS, *Mg.*—Inverdrue, May 1895 (Clarke).

Family LIMNOBIDÆ.

4. PEDICIA RIVOSA, *L.*—Inverdrue, May 1895 (Clarke).

Family TIPULIDÆ.

5. TIPULA LUNATA, *L.*—Inverdrue, May 1895 (Clarke).

Family RHYPHIDÆ.

6. RHYPHUS FENESTRALIS, *Scop.*—Inverdrue, May 1895 (Clarke).

Family STRATIOMYIDÆ.

7. MICROCHRYSA POLITA, *L.*—Aviemore, June 1893 (Evans).

Family TABANIDÆ.

8. HÆMATOPOTA PLUVIALIS, *L.*—Aviemore, June 1893 (Evans).
 9. HÆMATOPOTA CRASSICORNIS, *Whlg.*—Aviemore, June 1893 (Evans).
 10. THERIOPLECTES TROPICUS, *L.*—Aviemore, June 1893 (Evans); Inverdrue, May 1895 (Clarke).
 11. THERIOPLECTES SOLSTITIALIS, *Mg.*—Aviemore, June 1893 (Evans); Rothiemurchus, June-July 1895 (Hinxman); Aviemore, July 1898 (Yerbury).
 12. TABANUS SUDETICUS, *Zeller.*—Kincraig, near Kingussie, August 1889 (Evans).
 13. CHRYSOPS CÆCUTIENS, *L.*—Kincraig, near Kingussie, August 1889 (Evans).
 14. CHRYSOPS QUADRATUS, *Mg.*—Aviemore, July 1899 (Yerbury).
 15. CHRYSOPS RELICTUS, *Mg.*—Aviemore, June 1893 (Evans); Rothiemurchus, June-July 1895 (Hinxman); Aviemore, July 1898 (Yerbury).

Family LEPTIDÆ.

16. LEPTIS SCOLOPACEA, *L.*—Rothiemurchus, June-July 1895 (Hinxman).
 17. LEPTIS NOTATA, *Mg.*—Aviemore, July 1899 (Yerbury).
 18. LEPTIS TRINGARIA, *L.*—Kingussie, July 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury).
 19. LEPTIS LINEOLA, *Fab.*—Rothiemurchus, June-July 1895 (Hinxman); Aviemore, July 1899 (Yerbury).
 20. ATHERIX IBIS, *Fab.*—Aviemore, June 1893 (Evans).

Family ASILIDÆ.

21. DIOCTRIA REINHARDI, *Wied.*—Four specimens, Nethy Bridge, August 1898 (Yerbury).
 22. LAPHRIA FLAVA, *L.*—Rothiemurchus, June 1893 (Evans); Rothiemurchus, June-July 1895 (Hinxman).
 23. DYSMACHUS TRIGONUS, *Mg.*—One male, Kingussie, July 1898 (Yerbury).

Family THEREVIDÆ.

24. *THEREVA ANNULATA*, *Fab.*—Aviemore, June 1893 (Evans);
Aviemore, July 1899 (Yerbury).

Family EMPIDÆ.

25. *RHAMPHOMYIA SULCATA*, *Fln.*—Inverdrue, May 1895 (Clarke).
26. *RHAMPHOMYIA ALBOSEGMENTATA*, *Ztt.*—Inverdrue, May 1895
(Clarke).
27. *RHAMPHOMYIA SPINIPES*, *Fln.*—Rothiemurchus, September-
October 1894 (Hinxman).
28. *EMPIS TESSELLATA*, *Fab.*—Rothiemurchus, June-July 1895
(Hinxman).
29. *EMPIS BOREALIS*, *L.*—Inverdrue, May 1895 (Clarke).
30. *TACHYDROMIA CURSITANS*, *Fab.*—Nethy Bridge, August 1898
(Yerbury).

Family DOLICHOPODIDÆ.

31. *DOLICHOPUS CLAVIGER*, *Stan.*—Aviemore, July 1899 (Yerbury).
32. *ARGYRA ARGYRIA*, *Mg.*—Rothiemurchus, June-July 1895
(Hinxman).
33. *LIANCALUS VIRENS*, *Scop.*—Rothiemurchus, September-October
1894 (Hinxman).

Family SYRPHIDÆ.

34. *CHRYSOGASTER HIRTELLA*, *Lw.*—Kingussie, August 1898
(Yerbury).
35. *CHILOSIA ANTIQUA*, *Mg.*—Aviemore, July 1899 (Yerbury).
36. *LEUCOZONA LUCORUM*, *L.*—Aviemore, July 1899 (Yerbury).
37. *MELANOSTOMA MELLINUM*, *L.*—Rothiemurchus, June-July
1895 (Hinxman); Nethy Bridge, August 1898 (Yerbury).
38. *PYROPHÆNA OCYMI*, *Fab.*—Aviemore, July 1899.
39. *PLATYCHIRUS ALBIMANUS*, *Fab.*—Inverdrue, May 1895
(Clarke); Rothiemurchus, June-July, 1895 (Hinxman).
40. *PLATYCHIRUS PELTATUS*, *Mg.*—Aviemore, July 1898 (Yerbury);
Nethy Bridge, August 1898 (Yerbury).
41. *PLATYCHIRUS CLYPEATUS*, *Mg.*—Rothiemurchus, June-July
1895 (Hinxman).
42. *DIDEA ALNETI*, *Fln.*—Female, Rothiemurchus, June-July 1895
(Hinxman).

43. *DIDEA FASCIATA*, *Mcq.*—Two females, Nethy Bridge, August 1898 (Yerbury); two females, Aviemore, July 1899 (Yerbury).
44. *SYRPHUS BARBIFRONS*, *Fln.*—Male, Inverdrue, May 1895 (Clarke); two males on window of hotel, Nethy Bridge, August 1898 (Yerbury).
45. *SYRPHUS COMPOSITARUM*, *Verrall.*—Kingussie, July 1898 (Yerbury); Aviemore, July-August 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury).
46. *SYRPHUS CINCTELLUS*, *Ztt.*—Nethy Bridge, August 1898 (Yerbury).
47. *SYRPHUS CINCTUS*, *Fln.*—Through the kindness of the Rev. E. N. Bloomfield, I have seen a female of this species which was taken by Mr. G. H. Verrall at Inverness in June 1884.
48. *SYRPHUS LAPPONICUS*, *Ztt.*—Col. Yerbury took a male of this rare and interesting species at Aviemore in July of the past year (1899). The only other British record appears to be that given by Verrall in the "Ent. Mo. Mag.," vol. xxii. p. 230 (1886), which refers to a female caught at Pitlochrie in June 1870.
49. *SYRPHUS LUNIGER*, *Mg.*—Inverdrue, May 1895 (Clarke); Nethy Bridge, August 1898 (Yerbury).
50. *SYRPHUS VITTIGER*, *Ztt.*—Aviemore, June 1893 (Evans); Kingussie, July 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury); Aviemore, July 1899 (Yerbury).
51. *SYRPHUS RIBESII*, *L.*—Aviemore, April 1893 (Evans); Rothiemurchus, September-October 1894 (Hinxman); Inverdrue, May 1895 (Clarke); Rothiemurchus, June-July 1895 (Hinxman).
52. *SYRPHUS GROSSULARIÆ*, *Mg.*—Rothiemurchus, September-October 1894 (Hinxman); Aviemore, July 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury); Aviemore, July 1899 (Yerbury).
53. *SYRPHUS TRICINCTUS*, *Fln.*—Kingussie, July 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury); Aviemore, July 1899 (Yerbury).
54. *SYRPHUS ANNULIPES*, *Ztt.*—Two males and one female, Nethy Bridge, August 1898 (Yerbury).
55. *SYRPHUS ALBOSTRIATUS*, *Fln.*—Inverdrue, May 1895 (Clarke).
56. *SYRPHUS LATERNARIUS*, *Müll.*—Aviemore, July 1899 (Yerbury).
57. *SPHÆROPHORIA PICTA*, *Mg.*—Rothiemurchus, June-July 1895 (Hinxman).

58. *SPHEGINA CLUNIPES*, *Flu.*—A male of this species, taken by Verrall at Inverness in June 1884, was kindly sent for my inspection by the Rev. E. N. Bloomfield.
59. *VOLUCELLA PELLUCENS*, *L.*—Rothiemurchus, June-July 1895 (Hinxman).
60. *SERICOMYIA LAPPONA*, *L.*—Rothiemurchus, June-July 1895 (Hinxman); Kincaig, August 1899 (Evans).
61. *ARCTOPHILA MUSSITANS*, *Fab.*—Male and female, Nethy Bridge, August 1898 (Yerbury).
62. *ERISTALIS TENAX*, *L.*—Rothiemurchus, September-October 1894 (Hinxman).
63. *ERISTALIS INTRICARIUS*, *L.*—Inverdrue, May 1895 (Clarke); Rothiemurchus, June-July 1895 (Hinxman).
64. *ERISTALIS ARBUSTORUM*, *L.*—Rothiemurchus, September-October 1894 (Hinxman); Inverdrue, May 1895 (Clarke).
65. *ERISTALIS RUPIUM*, *Fab.*—Rothiemurchus, September-October 1894, and June-July 1895 (Hinxman).
66. *ERISTALIS PERTINAX*, *Scop.*—Rothiemurchus, September-October 1894 (Hinxman); Inverdrue, May 1895 (Clarke); Kingussie, July 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury).
67. *ERISTALIS NEMORUM*, *L.*—Rothiemurchus, June-July 1895 (Hinxman).
68. *HELOPHILUS PENDULUS*, *L.*—Aviemore, June 1893 (Evans); Aviemore, July 1899 (Yerbury).
69. *HELOPHILUS LINEATUS*, *Fab.*—Aviemore, July 1899 (Yerbury).
70. *CRIORRHINA FALLAX*, *L.*—Aviemore, July 1899 (Yerbury). This is the species given in Verrall's "List of British Diptera" (1888) as *Spilomyia fallax*.
71. *XYLOTA SYLVARUM*, *L.*—Kingussie, July 1899 (Yerbury).
72. *SYRITTA PIPIENS*, *L.*—Inverdrue, May 1895 (Clarke); Rothiemurchus, June-July 1895 (Hinxman).
73. *CHRYSOXUM ARCUATUM*, *L.*—Aviemore, June 1893 (Evans); Nethy Bridge, August 1898 (Yerbury); Aviemore, July 1899 (Yerbury).

Family CONOPIDÆ.

74. *CONOPS QUADRIFASCIATUS*, *Deg.*—Nethy Bridge, August 1898 (Yerbury).

Family OESTRIDÆ.

75. *CEPHENOMYIA AURIBARBIS*, *Mg.*—As recorded in the "Annals" for 1896 (p. 61), two males and one female of this interesting Bot-fly were captured by Mr. Hinxman on the slopes of

Cairngorm, Glenmore Forest, in June 1895. Hitherto this species has been referred to under the name of *C. rufibarbis*, Mg., but as Meigen's description of *auribarbis* was printed on an earlier page in his "Systematische Beschreibung" than that of *rufibarbis*, both being now regarded as the same species, the name here used must in future serve as the correct designation. I am indebted to Mr. Ernest E. Austen, of the British Museum, for drawing my attention to this point.

Family TACHINIDÆ.

76. HYALOMYIA PUSILLA, *Mg.*—Male and female, Nethy Bridge, August 1898 (Yerbury).
77. ECHINOMYIA GROSSA, *L.*—Nethy Bridge, August 1898 (Yerbury).
78. ECHINOMYIA FERA, *L.* — Kingussie, July 1898 (Yerbury); Aviemore, July 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury).
79. MICROPALPUS VULPINUS, *Fln.*—Rothiemurchus, June-July 1895 (Hinxman); Kingussie, July 1898 (Yerbury); Aviemore, July 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury); Kingussie, July 1899 (Yerbury); Aviemore, July 1899 (Yerbury).
80. MICROPALPUS PUDICUS, *Rond.*—Two males and two females, Kingussie, July 1898 (Yerbury); three males and three females, Aviemore, July 1898 (Yerbury); seven males and seven females, Nethy Bridge, August 1898 (Yerbury); one male, Kingussie, July 1899 (Yerbury); seven males and two females, Aviemore, July 1899 (Yerbury). I have followed Austen ("Ent. Mo. Mag.," 1898, pp. 36-38) in referring this handsome species to *pudicus*, Rond. Whether Fallen's *hæmorrhoidalis* is the same species seems to be still open to doubt—if it is, then Rondani's name must be sunk as a synonym. At present it seems safer to call the insect *pudicus*, always bearing in mind that even its generic position may be called in question. For further particulars the note by Austen (*l.c.*) should be consulted.
81. SIPHONA GENICULATA, *Deg.*—Nethy Bridge, August 1898 (Yerbury); Aviemore, July 1899 (Yerbury).
82. SIPHONA CRISTATA, *Fab.*—Aviemore, July 1899 (Yerbury).
83. THRYPTOCERA CRASSICORNIS, *Mg.* — Aviemore, July 1899 (Yerbury).
84. THRYPTOCERA BICOLOR, *Mg.*—One specimen, Aviemore, July 1899 (Yerbury).

85. *THRYPTOCERA MINUTISSIMA*, *Ztt.*—A single specimen of this rare species captured at Nethy Bridge, August 1898 (Yerbury).
86. *MACQUARTIA TENEBRICOSA*, *Mg.*—Female, Aviemore, July 1899 (Yerbury).
87. *ERIGONE STRENUA*, *Mg.*—Aviemore, July 1899 (Yerbury).
88. *CHETOLYGA QUADRIPISTULATA*, *Fab.*—Kingussie, July 1898 (Yerbury); Aviemore, July 1899 (Yerbury).
89. *OLIVIERIA RUFOMACULATA*, *Deg.*—Kingussie, July 1898 (Yerbury); Aviemore, July 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury); Aviemore, July 1899 (Yerbury).
90. *EXORISTA VULGARIS*, *Fln.*—Aviemore, July 1899 (Yerbury).
91. *SISYROPA LOTA*, *Mg.*—Three males and one female, Kingussie, July 1898 (Yerbury); four males and four females, Nethy Bridge, August 1898 (Yerbury); seven males and two females, Aviemore, July 1899 (Yerbury).
92. *MEIGENIA FLORALIS*, *Mg.*—Aviemore, July 1899 (Yerbury).
93. *MASICERA RUTILA*, *Mg.*—Aviemore, July 1899 (Yerbury).
94. *METOPIA LEUCOCEPHALA*, *Rossi.*—Eleven females, Aviemore, July 1899 (Yerbury).
95. *METOPIA ARGYROCEPHALA*, *Mg.*—Aviemore, July 1899 (Yerbury).

Family DEXIDÆ.

96. *MYIOCERA CARINIFRONS*, *Fln.*—Kingussie, July 1898 (Yerbury); Aviemore, July 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury); Kingussie, July 1899 (Yerbury); Aviemore, July 1899 (Yerbury).
97. *DEXIA VACUA*, *Fln.*—Rothiemurchus, June and July 1895 (Hinxman); Kingussie, July 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury); Aviemore, July 1899 (Yerbury).

Family SARCOPHAGIDÆ.

98. *SARCOPHAGA CARNARIA*, *L.*—Aviemore, July 1899 (Yerbury).
99. *SARCOPHAGA ALBICEPS*, *Mg.*—Aviemore, July 1899 (Yerbury).
100. *SARCOPHAGA ATROPOS*, *Mg.*—Nethy Bridge, August 1898 (Yerbury).
101. *CYNOMYIA MORTUORUM*, *L.*—Kingussie, July 1898 (Yerbury); Nethy Bridge, August 1898 (Yerbury).
102. *CYNOMYIA ALPINA*, *Ztt.*—One female, Nethy Bridge, August 1898 (Yerbury); nine males and one female, Aviemore, July 1899 (Yerbury). Evidently this species, only recently con-

firmed as British, is not uncommon in Scotland. The female is wonderfully like the common Bluebottle (*Calliphora erythrocephala*, Mg.).

103. *ONESIA SEPULCHRALIS*, Mg.—Inverdrue, May 1895 (Clarke); one male and a tiny female, Kingussie, July 1898 (Yerbury); two males, Nethy Bridge, August 1898 (Yerbury).

[Two small specimens, both males, belonging to the present genus, but very different from *sepulchralis*, were captured by Col. Yerbury at Kingussie in July 1898. They are evidently new to Britain, if not to science.]

Family MUSCIDÆ.

104. *LUCILIA CORNICINA*, Fab.—Inverdrue, May 1895 (Clarke).
 105. *LUCILIA CÆSAR*, L.—Rothiemurchus, September-October 1894 (Hinxman); Nethy Bridge, August 1898 (Yerbury).
 106. *LUCILIA SERICATA*, Mg.—Inverdrue, May 1895 (Clarke); Rothiemurchus, June-July 1895 (Hinxman).
 107. *CALLIPHORA ERYTHROCEPHALA*, Mg.—Rothiemurchus, June-July 1895 (Hinxman).
 108. *CALLIPHORA VOMITORIA*, L.—Inverdrue, May 1895 (Clarke); Nethy Bridge, August 1898 (Yerbury).
 109. *POLLENIA VESPILLO*, Fab.—Kingussie, July 1898 (Yerbury).
 110. *POLLENIA RUDIS*, Fab.—Rothiemurchus, September-October 1894 (Hinxman); Kingussie, July 1898 (Yerbury).
 111. *PYRELLIA CYANICOLOR*, Ztt.—Three males and one female of this lovely species taken at Aviemore, July 1899 (Yerbury).
 112. *PYRELLIA LASIOPHTHALMA*, Mcq.—One male and two females, Nethy Bridge, August 1898 (Yerbury); one female, Aviemore, July 1899 (Yerbury).
 113. *MESEMBRINA MERIDIANA*, L.—Rothiemurchus, June-July 1895 (Hinxman); Nethy Bridge, August 1898 (Yerbury).
 114. *GRAPHOMYIA MACULATA*, Scop.—Aviemore, July 1899 (Yerbury).
 115. *GRAPHOMYIA PICTA*, Ztt.—Three males, Kingussie, July 1898 (Yerbury); three males, Nethy Bridge, August 1898 (Yerbury); one male, Aviemore, July 1899 (Yerbury). It is doubtful whether this form, of which I do not know the female, is entitled to specific rank. It may be only a variety of the preceding.
 116. *MORELLIA SIMPLEX*, Lw.—Male, Kingussie, July 1898 (Yerbury); male, Nethy Bridge, August 1898 (Yerbury); three males, Aviemore, July 1899 (Yerbury).
 117. *MORELLIA HORTORUM*, Fln.—Female, Kingussie, July 1898 (Yerbury); male, Nethy Bridge, August 1898 (Yerbury).

Family ANTHOMYIDÆ.

118. POLIETES LARDARIA, *Fab.*—Rothiemurchus, September-October 1894 (Hinxman).
119. HYETODESIA INCANA, *Wied.*—Rothiemurchus, June-July 1895 (Hinxman).
120. HYETODESIA HIRSUTULA, *Ztt.*—Rothiemurchus, June-July 1895 (Hinxman).
121. HYETODESIA BASALIS, *Ztt.*—Rothiemurchus, September-October 1894 (Hinxman); Rothiemurchus, June-July 1895 (Hinxman).
122. HYETODESIA SCUTELLARIS, *Fln.*—Rothiemurchus, June-July 1895 (Hinxman).
123. HYETODESIA FLAVEOLA, *Fln.*—Rothiemurchus, June-July 1895 (Hinxman).
124. SPILOGASTER DUPLICATA, *Mg.*—Inverdrue, May 1895 (Clarke).
125. HYDROTÆA DENTIPES, *Fab.*—Male, Kingussie, July 1898 (Yerbury).
126. HYDROTÆA SIMILIS, *Meade.*—Three males, Kingussie, July 1898 (Yerbury); male and female *in coitu*, and two females, Aviemore, July 1899 (Yerbury).
127. HYDROTÆA IRRITANS, *Fln.*—One male and three females, Aviemore, July 1899 (Yerbury).
128. HYDROTÆA METEORICA, *L. (?)*—Three females, which I refer to this species, taken at Inverdrue, May 1895 (Clarke).
129. DRYMEIA HAMATA, *Fln.*—Male, Rothiemurchus, September-October 1894 (Hinxman).
130. HYDROPHORIA DIVISA, *Mg.*—Male, Aviemore, June 1893 (Evans).
131. HYDROPHORIA LINOGRISEA, *Mg.*—A male kindly sent for my inspection by the Rev. E. N. Bloomfield, taken by Verrall at Inverness in June 1884.
132. HYLEMYIA STRIGOSA, *Fab.*—Female, Aviemore, July 1899 (Yerbury).
133. CHORTOPHILA SYLVESTRIS, *Fln.*—Male, Rothiemurchus, June-July 1895 (Hinxman). For the identification of this specimen I am indebted to Dr. Meade, of Bradford.
134. HOMALOMYIA APRICA, *Hal.*—A female, taken by Verrall at Inverness in June 1884, was kindly sent to me for inspection by the Rev. E. N. Bloomfield.
135. CARICEA TIGRINA, *Fab.*—Aviemore, July 1899 (Yerbury).

136. *MACRORCHIS MEANS*, *Mg.*—Three males, Aviemore, July 1899 (Yerbury).
 137. *HOPLOGASTER MOLLICULA*, *Fln.*—Male, Nethy Bridge, August 1898 (Yerbury).

Family SCATOMYZIDÆ.

138. *CORDYLURA PUDICA*, *Mg.*—Four males, Aviemore, July 1899 (Yerbury).
 139. *CORDYLURA RUFIMANA*, *Mg.*—Male, Aviemore, July 1899 (Yerbury).
 140. *CORDYLURA PUBERA*, *Fab.*—Five males, Aviemore, July 1899 (Yerbury).
 141. *NORELLIA STRIOLATA*, *Mg.*—Female, Aviemore, July 1899 (Yerbury).
 142. *POGONOTA HIRCUS*, *Ztt.*—Two males and one female of this remarkable species taken at Kingussie, July 1899 (Yerbury).
 143. *MICROPROSOPA PALLICAUDA*, *Ztt.*—Female, Aviemore, April 1893 (Evans).
 144. *TRICHOPALPUS PUNCTIPES*, *Mg.*—Female, Aviemore, July 1899 (Yerbury).
 145. *SCATOPHAGA SUILLA*, *Fab.*—Two males and one female, Aviemore, July 1899 (Yerbury).
 146. *SCATOPHAGA INQUINATA*, *Mg.*—Male, Rothiemurchus, September-October 1894 (Hinxman).
 147. *SCATOPHAGA STERCORARIA*, *L.*—Female, Aviemore, April 1893 (Evans).

Family HELOMYZIDÆ.

148. *HELOMYZA OLENS*, *Mg.*—Male, Rothiemurchus, September-October 1894 (Hinxman).
 149. *TEPHROCHLAMYS FLAVIPES*, *Ztt.*—Female, Rothiemurchus, September-October 1894 (Hinxman). The only other British locality hitherto recorded for this species appears to be Newmarket, where a couple of females were taken by Mr. Verrall in October 1889 (see "Ent. Mo. Mag.," 1894, p. 144).

Family SCIOMYZIDÆ.

150. *DRYOMYZA ANILIS*, *Fln.*—Nethy Bridge, August 1898 (Yerbury); Kingussie, July 1899 (Yerbury).
 151. *DRYOMYZA DECREPITA*, *Ztt.*—Eleven specimens, Aviemore, July 1899 (Yerbury).
 152. *SCIOMYZA PALLIDA*, *Fln.*—Three males and one female, Aviemore, July 1899 (Yerbury).

153. *PHÆOMYIA FUSCIPENNIS*, *Mg.*—Male and female *in coitû*, and a second male, Aviemore, July 1899 (Yerbury).
154. *TETANOCERA FERRUGINEA*, *Fln.*—Male, Kingussie, July 1898 (Yerbury).
155. *TETANOCERA ROBUSTA*, *Lw.*—Female, Aviemore, July 1899 (Yerbury).
156. *TETANOCERA RETICULATA*, *L.*—Kingussie, August 1898 (Yerbury); Aviemore, July 1899 (Yerbury).
157. *TETANOCERA UMBRARUM*, *L.*—Two males and two females, Aviemore, July 1899 (Yerbury).
158. *TETANOCERA PUNCTULATA*, *Scop.*—Two males, Aviemore, July 1897 (Yerbury).
159. *LIMNIA UNGUICORNIS*, *Scop.*—Male, Aviemore, July 1899 (Yerbury).
160. *ELGIVA ALBISETA*, *Scop.*—Male and female, Aviemore, July 1899 (Yerbury).
161. *ELGIVA DORSALIS*, *Fab.*—Male and female, Aviemore, July 1899 (Yerbury).
162. *ELGIVA LINEATA*, *Fln.*—Two males and five females, Aviemore, July 1899 (Yerbury).

Family PSILIDÆ.

163. *LOXOCERA ARISTATA*, *Pz.*—Kingussie, July 1898 (Yerbury); Aviemore, July 1899 (Yerbury).

Family MICROPEZIDÆ.

164. *CALOBATA PETRONELLA*, *L.*—Female, Nethy Bridge, August 1898 (Yerbury).

Family ORTALIDÆ.

165. *CEROXYS CRASSIPENNIS*, *Fab.*—Six specimens, Aviemore, July 1899 (Yerbury).

Family TRYPETIDÆ.

166. *SPILOGRAPHA HAMIFERA*, *Lw.*—Female, Aviemore, July 1899 (Yerbury). This species is evidently very rare, as the only reference to it as a British insect that I can find is the following remark by Verrall ("Ent. Mo. Mag.," xxii., 1886, p. 234): "I have a female of this from Scotland, given me by Dr. Algernon Chapman."
167. *TEPHRITIS MILIARIA*, *Schrk.*—Aviemore, July 1898 and July 1899 (Yerbury).

Family LONCHÆIDÆ.

168. PALLOPTERA SALTUUM, *L.*—Female, Aviemore, July 1899 (Yerbury).

Family SAPROMYZIDÆ.

169. SAPROMYZA RORIDA, *Fln.*—Aviemore, July 1899 (Yerbury).

Family OPOMYZIDÆ.

170. OPOMYZA GERMINATIONIS, *L.*—Rothiemurchus, June-July 1895 (Hinxman); Nethy Bridge, August 1898 (Yerbury); Aviemore, July 1899 (Yerbury).

Family EPHYDRIDÆ.

171. NOTIPHILA ANNULIPES, *Stnh.*—Aviemore, July 1899 (Yerbury).
 172. OCHTHERA MANTIS, *Deg.*—Aviemore, July 1899 (Yerbury).

Family BORBORIDÆ.

173. BORBORUS GENICULATUS, *Mcq.*—Rothiemurchus, June-July 1895 (Hinxman).

NOTES ON THE SCOTTISH SPECIES OF THE GENUS *HEMEROBIUS*.

By KENNETH J. MORTON, F.E.S.

IN recent numbers of the "Entomologist's Monthly Magazine" (commencing with that for April 1899), Mr. M'Lachlan has published notes which will form, when completed, practically a revision of the Palæarctic species of the genus *Hemerobius*. A reference was made to two of the papers in the July (1899) number of the "Annals," but a further notice of the subject may be useful, because important changes have been made in the nomenclature. Several species have not been elucidated satisfactorily hitherto, and, in consequence, considerable confusion exists in the Scottish records.

The members of the genus in question are widespread, and the greater number of the Palæarctic species are found in Scotland. Some of them extend to North America—a fact that may yet prove a disturbing element as regards names.

The following are the species known from Scotland :—

H. nervosus, F., is widely distributed in Scotland, and is usually rather common, especially where there is natural birch in quantity. It is probably the *betulinus* of Ström, an older name.

H. subnebulosus, Steph., is very abundant near houses, and is the *Hemerobius* of Edinburgh gardens.

H. mortoni, M'L., just described from a pair found at Rannoch in June 1898, is evidently not rare in the alpine and boreal regions of Europe. It is remarkable that it should have remained so long unnoticed, or at least undescribed, by Continental entomologists.

H. marginatus, Steph., is locally common, probably over the whole of Scotland. Like *H. nervosus*, it is fond of birch trees. I have seen it in many localities from Wigtownshire to Inverness.

H. lutescens, Fab., was at one time mixed with *H. humuli*, and afterwards confused with *H. orotypus*, Wallengren. All the published Scottish records under the last-mentioned name refer to *lutescens*.

H. humuli, Linn.—As indicated, two species were mixed under this name. I think recent records, at least, will refer to what is here called *humuli*.

H. orotypus, Wall.—This species is still little known, and is, no doubt, confused by Continental entomologists with some of the allied forms. Authentic Continental records are, however, confined to Scandinavia and the Pyrenees. In the British Isles it has been taken in Yorkshire, on Exmoor, and in Ireland, as well as in several Scottish localities. It may have been referred to previously without name, but no definite records of its occurrence in Scotland exist prior to those mentioned at page 189 *ante*.

H. stigma, Steph., is common wherever there are conifers. The records are under the name of *H. limbatus*.

H. pini, Steph.—The distribution of this species is uncertain. I have taken it in Lanarkshire, and it may be general, but perhaps not common.

H. atrifrons, M'L., has been recorded from Inverness-shire. It also occurs in the south, as I took a specimen from *Juniperus* near Cockburnspath in Berwickshire.

The last-mentioned two species constitute, with *H. limbatellus*, Zett. (not yet known from Scotland), a very closely allied group. It may be that they are really forms of one protean species.

H. nitidulus, Fab., and *H. micans*, Olivier, are rather common in many localities.

The only Scottish species not yet dealt with by Mr. M'Lachlan are *H. inconspicuus*, M'L., and *H. concinnus*, Steph.

H. inconspicuus has been found in Lanarkshire, Perthshire, and Inverness-shire, but is usually not common.

H. concinnus is not rare in the pine forest districts of the North, where its striking variety *quadrifasciatus*, Reuter, is also found.

While in existing records reference is made to the variability of the species, no attempt, as far as I know, has been made to separate the two forms with regard to the localities where they have been found. Definite observations are much wanted as to whether the type form and the so-called variety occur separately or together in the particular localities. The variety is so very well marked that this should be attended to carefully with the view to settle the claims of *quadrifasciatus* to the more exalted rank of a species.

TOPOGRAPHICAL BOTANY OF SCOTLAND.

By JAMES W. H. TRAIL, A.M., M.D., F.R.S.

(Continued from p. 172.)

[Names of plants in *italics*, except as synonyms within curved brackets, denote that the plants were *certainly* introduced into Scotland by man. † after a district-number denotes introduction by man into the district; “cas.” denotes casual occurrence, and “esc.” evident escape or outcast from cultivation, both being due to man’s agency. Square brackets enclosing the name of a plant or a district-number denote that the record was made in error. ? after a district-number denotes, at least, need of confirmation; after † it denotes doubt as to whether the plant owes its presence in the district to man. The SALICACEÆ, accidentally omitted from their proper place in our last issue, will be included in the Supplement. Corrections and additions to the records now published will be gratefully received and acknowledged by the compiler, whose earnest wish it is to supply an accurate statement of our present knowledge of the distribution of the uncultivated plants of Scotland, whether native or introduced by man intentionally or casually.—J. W. H. T.]

CYPERACEÆ.

- Eleocharis acicularis*, *R. Br.*, 72-78, 83, 85-90, 96, 99-101, 105 (?), 108, 111 (??), 112.
E. palustris, *R. Br.*, all.
E. uniglumis, *Reichb.*, 82, 84, 85, 88, 89, 91, 92, 94-97, 100-104, 106, 109-112.
 var. *b. Watsoni* (*Bab.*), 98.
 var. *pumila*, *Bonn.*, 110.
E. multicaulis, *Sm.*, except 78, 80, 82, 94, 107.
Scirpus pauciflorus, *Lightf.*, except 78, 93, 94, 107.
S. cæspitosus, *L.*, except 82.
S. fluitans, *L.*, except 72, 78, 79, 80, 82, 84, 98, 99, 106, 107.
S. cernuus, *Vahl.* (= *S. Savii*, *S. and Maur*), 74, 75, 97, 98, 100-103, (105), 106, 110.
S. setaceus, *L.*, all.
S. lacustris, *L.*, except 78, 84, 94.

- S. Tabernæmontani*, *Gmel.*, 73-76, 82, 85, 87-90, 93, 95-97, 99, 102-104, 106, 109-111.
- S. maritimus*, *L.*, *except* 77, 78, 79, 80, 94, 95, 107, 108, 109, 111, 112.
var. compactus, *Koch*, 110.
- S. sylvaticus*, *L.*, 72, 73, 75-81, 83, 85-94, 98, 99.
- S. Caricis*, *Retz.* (= *Blysmus compressus*, *Panz.*), 72, 73, 75, 76, 79-83, [99?], 100 [102?].
- S. rufus*, *Schrad.* (= *Blysmus rufus*, *Link.*), *except* 78, 79, 80, 86, 88, 89.
var. b. bifolius, *Walbr.*, 110.
- Eriophorum alpinum*, *L.*, 88, 90 (*extinct*), 108 (?).
- E. vaginatum*, *L.*, *except* 78.
- E. angustifolium*, *Roth.*, all.
- E. latifolium*, *Hoppe*, 72-74, 77, 81, 83, 87-90, 96-98, 101 (?), 105-108. [*E. gracile*, *Koch*, has been recorded from 88 and 90, almost certainly in error.]
- Rhynchospora fusca*, *Roem. and Schultz.*, 73, 97.
- R. alba*, *Vahl.*, *except* 78, 79, 80, 81, 82, 83, 84, 85, 89, 109, 111 (doubtful in 91-95).
- Schœnus ferrugineus*, *L.*, 88.
- S. nigricans*, *L.*, 72-76, 81, 85, 89-92, 94-112.
b. nanus, *Lange*, 105, 109, 112.
- Cladium jamaicense*, *Crantz*, 72-75, 81, 90 (*extinct*), 97, 100, 102, 103, 105, 108.
- Kobresia caricina*, *Willd.*, 88, 89, 98
- Carex dioica*, *L.*, *except* 78, 82.
- C. pulcaris*, *L.*, *except* 82.
- C. rupestris*, *All.*, 72 (?), 88, 90, 92, 105 (needs confirmation), 108.
- C. pauciflora*, *Lightf.*, *except* 74, 76, 77 (?), 78, 79, 80, 81, 82, 83, 84, 93, 102, 112.
- C. chordorhiza*, *Ehrh.*, 108.
- C. incurva*, *Lightf.*, 82, 83 (?), 84 (?), 85, 86 (Sonntag), 90-96, 106-112.
 [C. *divisa*, *Huds.*, has been recorded, apparently in error, from 83, 90.]
- C. disticha*, *Huds.*, *except* 78, 94, 95, 96, 97, 98, 101, 104, 105, 106, 107, 108, 110, 111, 112.
- C. arenaria*, *L.*, *except* 72, 78, 79, 80, 83, 84, 86, 87, 88, 89.
- C. teretiuscula*, *Good.*, *except* 78, 91, 93, 94, 97, 101, 103, 104, 105, 106, 109 (?), 111, 112.
var. b. Ehrhartiana (*Hoppe*), 74, 86.
- C. paniculata*, *L.*, *except* 76, 78, 88, 102, 104, 107, 112.
forma simplicior, *Anderss.*, 106.
- C. vulpina*, *L.*, *except* 78, 79, 80, 93, 96, 99, 105, 106, 107, 108, 109, 111, 112.

- C. muricata*, *L.*, except 78, 82, 90, 93, 94, 96, 97, 98, 101, 102, 103, 104, 105, 106, 108, 109, 110, 111, 112.
- [*C. divulsa*, *Good.*, has been recorded, probably in error, from 76, 83.]
- C. echinata*, *Murray* (= *C. stellulata*, *Good.*), except 78.
var. *Grypus*, *Schk.*, has been recorded from Perthshire and from 98, but reverts in cultivation to the type.
- C. remota*, *L.*, except 78, 82, 84, 85, 93, 104, 108, 109, 110, 111, 112.
- C. axillaris*, *Good.*, 72, 73, 83, 88. All these records greatly need confirmation.
- C. Boenninghauseniana*, *Weihe*, 75, 83, 88 (?), 94, 97.
- C. helvola*, *A. Blytt*, 88, 90, 92.
- C. elongata*, *L.*, 72, 73.
- C. approximata*, *Hoppe* (= *C. leporina* of "Top. Bot."), 90, 92, 94, 96.
- C. curta*, *Good.* (= *C. canescens*, *L.*), except 78, 103, 106, 107, 108, 109, 110, 111, 112.
var. *b. alpicola* (*Wahlenb.*), 88 (?), 89, 90, 92, 96, 97, 106, 108.
- C. ovalis*, *Good.* (= *C. leporina*, *L.*), all.
var. *capitata*, *Sonder*, 108.
- C. alpina*, *Sw.* (= *C. Vahlü*, *Schk.*), 88, 90, 92.
- C. atrata*, *L.*, 72, 86, 88-90, 92, 96-99.
- C. fusca*, *All.* (= *C. Buxbaumii*, *Wahlenb.*), 97.
- C. Hudsonii*, *Ar. Benn.* (= *C. stricta*, *Good.*), 73, 76, 77, 90, 92, 100, [83, 84, 85, 95, 98, 99, require confirmation].
- C. acuta*, *L.*, 73-77, 80, 81, 86, 88, 89, 98, 100, 102. [It has also been recorded from 83, 84, 90-93, 95, 96, 99, 101, 109, 111; but there is reason to believe that *C. aquatilis*, var. *elatior*, has been mistaken for *C. acuta* in most, if not all, of these counties.]
var. *gracilescens*, *Almq.*, 74, 86.
- C. rigida*, *Good.*, except 73, 74, 75, 76, 77, 79, 81, 82, 83, 84, 85, 91, 93, 95.
var. *hyperborea*, *Drejer*, 90. Mr. A. Bennett believes that *limula*, *Fr.*, also occurs in 90 (above Caenlochan). Herr Kükenthal regards *limula*, *Fr.*, as a hybrid between *rigida* and *Goodenowii*. A hybrid between these species has been recorded by Rev. E. S. Marshall from 98.
- C. aquatilis*, *Wahlenberg*, aggregate, except 74, 82, 83 (?), 91 (?), 100, 101, 102, 103, 104, 105, 106, 107, 110, 111, 112.
var. *b. elatior*, *Bab.* (= *Watsoni*, *Syme*), is the most common form of this sedge in Scotland, at least in lower localities. It has been recorded by name from most of the vice-counties under *aggr.*
var. *c. cuspidata*, *Læstad.*, 109.

- var. *d. epigejos*, *Læstad.*, 88 (?), 92.
 var. *e. virescens*, *Anderss.*, 73, 88, 89.
 var. *f. minor*, *Boott*, 72, 88-90, 92, 93.
 aquatilis \times rigida, 90, 98 (Rev. E. S. Marshall).
 [*C. salina*, *Wahlenberg.*]
 var. *b. kattedgattensis*, *Fries*, 96, 109.
 var. *epigejos*, *Fries* (*non* *Læstad.*). Mr. Bennett refers to this form specimens sent him by Dr. White from Caenlochan.
 aquatilis \times kattedgattensis (= *C. Grantii*, Ar. Benn.), 109.
C. cæspitosa, *L.*, 112 (Unst).
C. Goodenowii, *J. Gay* (= *C. vulgaris*, *Fries*), all.
 var. *b. juncella* (*T. M. Fries*), 74, 86, 88, 90, 95, 96, 104, 105, 108-110, 112.
 var. *d. melæna*, *Wimmer*, "Perthshire," 105 (G. C. Druce, who regards it as "simply a diseased state").
 (*C. spiculosa*, *Fr.*), *forma* *hebridense*, *Ar. Benn.*, 110, Harris. This is probably a hybrid between var. *juncella* and a form of *C. salina*. (See A. Bennett, in "Journ. Bot.," July 1897.)
C. flacca, *Schreb.* (= *C. glauca*, *Murray*), all.
 var. *b. Micheliana*, *Sm.*, 92.
 var. *c. stictocarpa*, *Druce*, 72, 88, 90, 98.
 var. *d. acuminata*, *Anderss.*, 110.
C. limosa, aggregate, 72, 73, 75-77, 80, 81, 84-90, 92, 94, 96-99, 101, 102, 104, 108-110.
C. magellanica, *Lam.* (= *C. irrigua*, *Smith*), 72, 73, 77, 83 (? Sonntag), 85-88, 90 (?), 92, 98, 99, 110.
C. limosa, *L.*, segregate, 72, 73, 75, 76, 80, 81, 84, 85, 87-90, 96-99, 101, 102, 104, 108-110.
C. rariflora, *Sm.*, 89, 90, 92, 94, 96 [108??].
C. pilulifera, *L.*, *except* 82, 84.
forma *reptans*, *Lange*, 112.
 var. *b. longibracteata*, *Lange* (= *Leesii*, *Ridley*), 90, 92, 105, 107.
C. verna, *Chaix* (= *C. præcox*, *Jacq.*), *except* 94, 97, 101, 103, 105, 106, 107, 109, 110, 112 (?).
C. pallescens, *L.*, *except* 80, 82, 84, 93, 94, 111, 112.
C. panicea, *L.*, all.
 var. *b. intermedia* (*Miég.*), 97.
 var. *tumidula*, *Læstad.*, 96, 105, 108.
C. pelia, *O. F. Lang*, 109. Kükenthal considers this to be *livida* \times *panicea*.
C. vaginata, *Tausch*, 72, 86, 88-90, 92, 94, 96-99, 105, 108, 109.
 The form *sparsiflora*, *Hartm.*, occurs in several places in Scotland, but it is scarcely more than a state of *vaginata*.
C. atrofusca, *Schk.* (= *C. ustulata*, *Wahlenb.*), 88.

- C. capillaris*, *L.*, 72, 87-90, 92, 94, 97, 98, 106, 108, 109, 112 (?).
var. major, 89.
- C. pendula*, *Huds.*, 72-77, 81-83, 86-88, 90 (?), 91, 92 (?), 93-95, 99.
 [C. strigosa, *Huds.*, has been recorded, in error, from 83 and 106.]
 [C. ventricosa, *Curtis* (= *C. depauperata*, Good.), has been recorded from 90, in error.]
- C. sylvatica*, *Huds.*, except 78, 84, 93, 94, 104, 106, 107, 108, 109, 110, 111, 112.
- C. lævigata*, *Sm.*, except 78, 80, 82, 84, 87, 89, 90 (?), 93, 95, 106, 107, 108, 109, 110, 111, 112.
- C. binervis*, *Sm.*, except 84.
- Mr. Bennett considers that the mountain form of this (for which Mr. Druce has proposed the name *nigrescens*) is "*β alpina*" of Drejer.
subsp. Sadleri, *Linton* (= "*frigida*, All.," of "Lond. Cat."), 90 (?), 92, 110.
- C. distans*, *L.*, except 76 (?), 77, 78, 79, 80, 81 (?), 83 (?), 87, 88, 89, 92, 93, 95, 96, 99, 104, 105, 107, 112 (?).
var. littoralis, *Anderss.*, 106 (near Tain).
- C. diluta*, *Bieb.* (= *C. punctata*, Gaud.), 73, 74.
- C. fulva*, *Good.* (including *Hornschuchiana*, *Bab.*), except 78, 82.
- C. extensa*, *Good.*, except 76, 77, 78, 79, 80, 84, 86, 87, 88, 89, 92, 93, 96, 104, 108, 112.
var. pumila, *Anderss.*, 96, 100, 105, 107, 108.
- C. flava*, *L.*, aggregate, all.
var. a. flava, segregate, 72-74, 80, 83, 85-92, 94-96, 98, 100, 103, 104, 106, 108, 109, 111, 112.
var. b. elatior, *Schlecht (lepidocarpa, Tausch.)*, 79, 84-92, 96, 102, 103, 109, 111, 112.
var. c. Cederi, *Ehrh. (minor, Towns., fide Mr. Bennett)*, 72, 74, 78, 88, 92, 94-98, 101, 107-112.
var. d. cyperoides, *Marss. (Cederi of "Eng. Bot., fide Mr. Bennett)*, except 76, 77, 78, 80, 81, 84, 93, 94.
flava × *fulva* (= *xanthocarpa*, Degl.), 72, 88-90, 92, 96, 98-102, 104, 105, 110, 111.
- C. filiformis*, *L.*, 72-75, 79-81, 83, 88-90, 92, 95-98, 101-108.
- C. hirta*, *L.*, except 104, 105, 106, 107, 108, 109, 110, 111, 112.
- C. Pseudo-cyperus*, *L.*, 95†, 102 ("by lake in Isla," *Lightfoot*).
- C. acutiformis*, *Ehrh.* (= *C. paludosa*, Good.), except 84, 85, 87, 92, 93, 94, 96, 97, 101, 103, 104, 105, 107, 108, 110, 111, 112.
- C. riparia*, *Curtis*, 72-77, 81-83, 85-87, 90-94, 96, 99, 105 (?), 106 (?), 110 (?).
- C. rostrata*, *Stokes* (= *C. ampullacea*, Good.) except 78.
var. b. elatior (Blytt) is recorded in Ewing's "Catalogue" for 76, 86, 102, 110.
var. brunnescens, *Anderss.*, 96.

- C. vesicaria*, *L.*, except 78, 82, 83 (?), 84, 92 (?), 93, 94, 104, 107, 108, 110, 111, 112.
 var. alpigena, *Fries*, 88.
 var. b. dichroa (*Anderss.*), found in 88, is referred by Prof. Bailey to *C. rostrata*.
C. rostrata × *vesicaria*, 88, 92.
C. pulla, *Good.*, aggregate, 72, 86 (?), 87, 88, 90, 92, 96-99, 104, 105, 108.
 var. b. Grahami (*Boott*), 88, 90.

GRAMINACEÆ.

- Panicum glabrum*, *Gaud.* (= *Digitaria humifusa*, *Pers.*), casual, e.g. in 92.
P. Crus-galli, *L.*, casual in 92.
P. miliaceum, *L.*, casual in 92.
Setaria viridis, *Beauv.*, casual, 80, 92.
S. verticillata, *Beauv.*, casual, 92.
Phalaris canariensis, *L.*, a frequent casual, 72-75, 86-89, 91, 92, 99, 102, 112.
P. cærulescens, *Desf.*, casual in 92.
P. arundinacea, *L.*, all.
Anthoxanthum odoratum, *L.*, all.
A. Puellii, *Lecoq.* and *Lamotte*, casual in 73, 80, 92 (*var. nana*).
Hierochloë borealis, *Roem.* and *Schult.*, 73, 109. Possibly also in 89 (Glen Shee) and 90 (Glen Cally); but these records need confirmation.
Alopecurus myosuroides, *Huds.* (= *A. agrestis*, *L.*), cornfield weed or casual in 72, 75-78, 82, 85-87, 89-92, 96-98, 108, 109.
[*A. fulvus*, *Sm.*, recorded on doubtful authority from 85, 86, 90, 109.]
A. geniculatus, *L.*, all.
A. pratensis, *L.*, except 97.
A. alpinus, *Sm.*, 88 (?), 89, 90, 92, 94, 96, 97.
 var. b. Watsoni, *Syme*, 89, 90, 92.
Milium effusum, *L.*, 72-77, 79-81, 83-93, 95, 96, 98, 99, 101, 102, 106, 107, 111 (?).
Phleum alpinum, *L.*, 88, 90, 92, 94, 96, 97.
P. pratense, *L.*, except 110 (?), 112 (?). *Watson* questions its claim to be native north of Caledonian Canal.
 var. b. nodosum (*L.*) } Probably not uncommon, though
 var. c. stoloniferum, *Bab.* } seldom specially recorded.
P. arenarium, *L.*, 72, 73, 82, 83, 85, 86, 90-93, 94 (?), 105.
Mibora verna, *Beauv.* (= *Chamagrostis minima*, *Borkh.*), 82†, 86†.
Agrostis canina, *L.*, except 81.
 var. b. scotica, *Hackel*, 90, 104, 105.
 var. grandiflora, *Hackel*, 95, 96, 98, 105, 109.
 var. mutica, *Gaud.*, 95, 96, 105, 112.

A. palustris, *Huds.* (= *A. alba*, *L.*), *except 80.*

var. *b. stolonifera* (*L.*), common. Specially recorded from 74, 86, 109, 111, 112.

var. *c. maritima*, *Mey.*, 75, 88, 95, 100, 103, 105, 108, 109, 112.

var. *d. coarctata*, *Hoffm.*, 88, 96, 105, 109, 112.

var. *patula*, *Gaud.*, 105, 109.

A. vulgaris, *With.*, all.

var. *b. pumila* (*L.*), common, 72, 74, 75, 86-98, 101, 102, 104, 112. (The ovaries are infested with spores of a *Tilletia*.)

var. *c. nigra* (*With.*), 87, 88, 91, 96, 97.

A. scabra, *Willd.*, 97.

Stipa capillata, *L.*, casual, *e.g.* at Grangemouth, in 86.

Polypogon monspeliensis, *Desf.*, casual, 80, 85, 86, 91.

P. littoralis, *Sm.*, casual, 80, 85.

Calamagrostis epigeios, *Roth.*, 74, 75, 80 (??), 85†, 86, 88, 89, 91, 92, 103.

C. lanceolata, *Roth.*, 73 (83, probably in error).

Gastridium australe, *Beauv.*, casual in 80.

Apera Spica-Venti, *Beauv.*, casual or introduced, 76, 83, 86.

A. interrupta, *Beauv.*, casual in 82.

Deyeuxia strigosa, *Kunth.*, 109.

D. neglecta, *Kunth.*, 90 (extinct).

var. *c. borealis*, *Ar. Benn.*, 88.

Ammophila arundinacea, *Host* (= *Psamma arenaria*, *L.*), *except 76, 78, 79, 80, 84, 88, 89, 99* (from 77, 98, 103, 105 without localities).

Lagurus ovatus, *L.*, casual in 87.

Aira caryophyllea, *L.*, all.

A. præcox, *L.*, all.

Iveingærtneria canescens, *Bern.*, error or introduced in 75, 97.

Deschampsia cæspitosa, *Beauv.*, all.

var. *b. alpina*, *Gaud.*, 88, 92, 94, 96, 97-99, 102, 103, 105, 108, 109 (102, 103 without localities).

var. *c. pseudo-alpina*, *Syme*, 86, 94, 96, 97 (99 without locality), 105, 107, 108, 110.

D. alpina, *Roem. and Schult.*, 86, 88-90, 92, 94, 96-99, 103, 108, 110 (?), 111 (? error).

D. discolor, *Roem. and Schult.*, 90 (?), 91, 92, 94-97, 102-104, 106-109, 112.

D. flexuosa, *Trin.*, *except 82.*

var. *b. montana*, *Hook. f.*, 86-90, 92, 94, 96-98, 100, 103-105, 110, 112.

var. *c. Voirlichensis*, *Melwill*, 88.

Holcus mollis, *L.*, all.

H. lanatus, *L.*, all.

Trisetum pratense, *Pers.* (= *Avena flavescens*, *L.*), except 93, 98, 102, 103, 104, 105, 107, 109, 110, 112. Probably has been "introduced" into some vice-counties.

Avena pubescens, *Huds.*, except 78, 79, 82, 93.

var. *glaberrima*, *Borb.*, 105, 108.

A. pratensis, *L.*, except 76, 77, 78, 82, 84, 100, 101, 102, 103, 105, 108, 109, 110, 112.

var. *b. alpina* (*Sm.*), 72, Perthshire, 92-94.

var. *c. longifolia* (*Parn.*), 88, 89.

A. strigosa, *Schreb.*, a weed in fields, etc., 72-74, 87-89, 92, 94-96, 107, 110, 111.

A. fatua, *L.*, a weed in fields, and casual, 72, 74, 75, 77, 80-83, 85, 87-89, 91, 92, 94-96, 105, 111, 112.

Arrhenatherum avenaceum, *Beauv.*, all; usually as var. *b. nodosum*, *Reichb.*

Sieglingia decumbens, *Bernh.* (= *Triodia decumbens*, *P. B.*), all.

Phragmites communis, *Trin.*, except 107 (?).

var. *b. nigricans*, *Gren. and Godr.*, 95, 96, 98, 105, 108.

Sesleria cærulea, *Ard.*, 86, 88, 96, 105 (reported erroneously from 92).

Cynosurus cristatus, *L.*, all.

Koeleria cristata, *Pers.*, except 76, 77 (?), 78, 84, 105, 108†, 112.

Molinia varia, *Schrank* (= *M. cærulea*, *Moench*), except 78.

var. *b. depauperata* (*Lindl.*), 83, 85, Perthshire, 91, 92, 96, 97, 105, 108.

Catabrosa aquatica, *Beauv.*, except 73, 76 (?), 78, 79, 80, 84, 98, 105.

var. *b. littoralis*, *Parn.*, 75, 95, 100-102, 110.

Melica nutans, *L.*, except 74, 78, 79, 85, 93, 100, 101, 102, 103, 104, 109, 110, 111, 112.

M. uniflora, *L.*, except 78, 82, 93, 94, 96, 97, 101, 102, 104, 105, 106, 108, 109, 110, 111.

Dactylis glomerata, *L.*, all.

Briza media, *L.*, except 76, 99, 100, 102, 103, 104, 105, 107, 108, 110, 111† (?), 112.

Poa annua, *L.*, all.

var. *b. supina*, *Gaud.*, 88, 92, 105, 108.

P. alpina, *L.*, 83 (Sonntag), 86-90, 92, 94, 96-99, 104, 108.

P. stricta, *Lindb.*, 90, 92, 97 } The records of both are in need of
P. laxa, *Haenke*, 90, 92, 97 (?) } being confirmed.

P. cenisia, *All.*, var. *flexuosa*, *Wahlenb.*, 88.

P. glauca (*Sm.*), 87, 88, 90, 92, 94, 98, 99, 104.

P. Balfourii (*Parn.*), 72 (?), 88, 90, 96, 98, 105 (92 in "Eng. Bot.," iii.).

- P. nemoralis*, *L.*, 72, 75-80, 83, 86-92, 94-101, 104-106, 110†.
 var. *c.* *Parnellii*, *Hk.* and *Arn.*, 89, 92, 95, 96.
 var. *d.* *divaricata*, *Syme*, 88, 92, 98.
 var. *e.* *coarctata* (*Gaud.*), 89.
 var. *glaucantha*, *Reichb.*, recorded from 72, 88, 97, 104.
- P. compressa*, *L.*, 76, 77, 80, 81, 83, 85 (?), 86, 88, 89, 90 (?), 106† (?) (111 and 112 are errors).
 var. *b.* *subcompressa* (*Parn.*), 89.
- P. Chaixii*, *Vill.* (= *P. sudetica*, *Haenke*), casual in 72, 80, 88, 89.
- P. pratensis*, *L.*, *except* 107.
 var. *b.* *subcærulea* (*Sm.*), 72, 74, 84, 88, 89, 92, 105-110, 112.
 var. *c.* *angustifolia* (*L.*), 108.
 var. *d.* *strigosa* (*Gaud.*), 88, 89.
- P. palustris*, *L.*, 88, doubtfully indigenous.
- P. trivialis*, *L.*, *except* 107.
 var. *b.* *Koeleri* (*DC.*), 73, 88.
 var. *d.* *glabra*, *Doell.*, 105, 109.
- Glyceria fluitans*, *R. Br.*, *except* 84.
 var. *b.* *triticea*, *Fries*, 108, 110.
- G. plicata*, *Fries*, 80-82, 84-86, 88, 89, 96, 98, 100, 101, 106, 111 (?).
 var. *b.* *pedicellata* (*Townsend*), 88, 89, 98.
 var. *d.* *depauperata*, *Crépin*, 96.
- G. aquatica*, *Sm.*, 72-77, 83-90, 92†, 95, 99, 103.
- G. maritima*, *Mert.* and *Koch*, *except* 77, 78, 79, 80, 88.
- G. distans*, *Wahlenb.*, 73, 76 (?), 83 (?), 85-87, 89, 90, 92, 108, 109, 111, 112.
 var. *b.* *prostrata*, *Beeby*, 112.
- Festuca procumbens*, *Kunth.*, 86†, and doubtfully in 75, 81, 83, 90.
- F. rigida*, *Kunth.*, 83, 85, 87, 90, 91† (?), 92† (?), 106.
- F. rottboellioides*, *Kunth.* (= *Poa loliacea*, *Huds.*), 73-75, 83, 85, 86, 90 (?), 97, 101-103, 110, 111 (?).
- F. Myuros*, *L.* (= *F. Pseudo-myuros*, *Koch*), casual, or introduced probably in 72, 73, 77, 81, 85, (90?).
- F. sciuroides*, *Roth.*, *except* 79, 82, 84, 104, 110†, 111†.
- F. ovina*, *L.*, all.
 var. *b.* *capillata*, *Hackel*, 74, 97, 109.
 var. *c.* *glauca* (*Lam.*), common, along coasts especially, though recorded by name from 97 and 104 only.
- F. duriuscula*, *Sm.*, aggregate, all.
- F. rubra*, *L.*
 var. *b.* *arenaria* (*Osbeck*), 72-77, 81, 83 (?), 85, 88, 90-96, 100, 101, 104, 106, Sutherland, 109, 110, 111 (?), 112 (?).
sub-vars. *grandiflora*, *Hackel*, 88, 89, 98, 106, 109, 110, and *junceae*, *Hackel*, 109.

- var. *c. fallax*, *Thuill.* (= *F. duriuscula*, segr.). Probably common.
- var. *d. pruinosa*, *Hackel*, 104-107.
- sub-var. *barbata*, *Hackel*, on Am Teallach in 105.
- F. sylvatica*, *Vill.*, 72, 73, 75, 77 (?), 83, 86-89, 91, 92, 94-97, 99, 101 (without locality), 105.
- F. elatior*, *L.*, aggregate, *except* 107.
- var. *b. pseudo-loliacea*, *Hackel*, 72 ("Fl. Dumf."), 109.
- var. *c. pratensis*, *Huds.*, recorded from all *except* 74, 78, 84, 93, 95, 97, 98, 104, 105, 107, 110, 112.
- var. *pratensis*, *Huds.* × *Lolium perenne* (= *F. loliacea*, *Curt.*), bracketed with *pratensis*, *Huds.*, in "Top. Bot.," ed. 2, occurs occasionally in most vice-countries, though expressly recorded from few, *e.g.* 72, 92.
- F. arundinacea*, *Schreb.*, bracketed in "Top. Bot.," ed. 2, with *F. elatior*, probably occurs in a number of vice-countries; but the records are in much need of revision, the forms having been often included under the same name by the recorders. It seems thus scarcely worth while to enumerate those from which "*arundinacea*" has been named.
- f. *strictior*, *Hackel*, 109.
- Bromus giganteus*, *L.*, *except* 78, 104, 107, 108, 109, 110, 111, 112.
- var. *b. triflorus*, *Syme*, 88, 90, 106.
- B. ramosus*, *Huds.* (= *B. asper*, *Murray*), *except* 78, 96, 97, 104, 108, 110, 111, 112.
- var. *a. serotinus* (*Benek.*), 97.
- B. erectus*, 83, 85. (Also recorded for 72, 73, 82, but doubtfully native in Scotland.)
- B. madritensis*, *L.*, has been recorded from 83 and 85, but as a casual.
- B. rubens*, *L.*, casual at Inverurie, in 93.
- B. sterilis*, *L.*, *except* 96, 97, 101, 102, 104, 105, 107, 108, 110, 112; perhaps not native in all.
- B. secalinus*, *L.*, 72, 73, 75, 76, 83, 84, 86, 87, 90-92, 95, 97, 105, 111; probably introduced in most districts, among grass seeds.
- var. *b. velutinus* (*Schrad.*) has been recorded from 74, 83, and 111, but records need confirmation.
- B. racemosus*, *L.*, 72-78, 81, 83, 87, 92, 96, 97, 99, 105, 111.
- B. commutatus*, *Schrad.*, 72-75, 76†, 77†, 78, 79, 82, 83, 85-87, 89-102, 105, 106, 108, 111 (?), 112†. ("Top. Bot.," ed. 2, includes *racemosus* under *commutatus*. The records need revision.)
- B. mollis*, *L.*, all.
- var. *b. glabratus*, *Doell.*, is recorded from 75, 88, 89, 105.

- B. arvensis*, L., introduced or casual in 74, 85, 86, 90, 92. (The records of this species are too much confused with some of the preceding, to permit of disentangling them.)
- Brachypodium gracile*, Beauv. (= *B. sylvaticum*, Roem. and Schult.), except 112.
- (*B. pinnatum*, Beauv., recorded in error from 85 and 94.)
- Lolium perenne*, L., all. Some of the varieties are of frequent occurrence in fields and waste places, *italicum* (Braun) being especially common.
- L. temulentum*, L., 72, 82†, 87†, 88 cas., 89 cas., 92 cas., 95† (?).
Of very uncertain occurrence, scarcely more than a casual.
Var. *b. arvense* (With.) is commoner than type.
- Agropyrum caninum*, Beauv., except 82, 84, 98, 99, 102, 104, 107 (?), 109, 110, 112.
var. *b. Donianum* (F. B. White), 88.
- A. repens*, L., all. (Mr. G. C. Druce records vars. *maritimum*, Druce, and *cæsium*, Doell., from 105, W. Ross.)
var. *Leersianum*, Gray, 75, 78, 86, 88, 91, 92, 105, 107, 109, 112.
- A. pungens* (?), Roem. and Schult., 75 (?), 103, 106 (?).
var. *b. littorale* (Reichb.), 83, 85, 99-101, 104, 107, 111, 112.
- A. acutum*, Roem. and Schult., 73, 74, 83, 85, 95, 100, 105, 106, 108, 110, 111.
- A. junceum*, Beauv., 72-75, 85, 87, 91-97, 100-112.
- Lepturus filiformis*, Trin. (including var. *b. incurvatus* (Trin.)), 72, 73, 75, 82, 83 (?), 84, 85, 100, 102, 103 (?).
- Ægilops triuncialis*, L., and *Æ. caudata*, L., casuals, 92.
- Nardus stricta*, L., all.
- Hordeum secalinum*, Schreb. (= *H. pratense*, Huds.), 73, 81 (in Berwick), 86, 87 (reported from 75, 83, 85).
- H. murinum*, L., 75, 80-86, 89, 90, 91†, 92†, 95†, 109† (from 111 in error).
- H. marinum*, Huds. (= *H. maritimum*, With.), 84, 87, 90 (? error); very doubtfully native.
- Elymus arenarius*, L., 72 (?), 75, 82, 85, 90-97, 100, 101, 104, 105, 107-112 (extending its range and abundance).
- (Several cultivated cereals, e.g. *Avena sativa*, *A. orientalis*, *Triticum sativum*, and other "wheats," *Hordeum distichum*, *H. hexastichum*, *Secale cereale*, etc., occur frequently as casuals in many districts.)

(To be continued.)

ON THE SEED DISPERSAL OF *PINUS SYLVESTRIS* AND *BETULA ALBA*.

By ROBERT SMITH, B.Sc., University College, Dundee.

ALTHOUGH much has been written on the subject of the adaptations of plants for the dispersal of their seeds, there is still a lack of precise information with regard to the distance to which the seeds of even common species may be carried by these means. Fliche, who may be regarded as the chief contributor to this subject, has given¹ a series of measurements which he made of the distances between certain seedlings and their parent trees. His figures are remarkably small; thus the greatest distance to which the seeds of *Pinus sylvestris* were carried was only 115 metres, of *Fagus sylvatica* 500-600 metres, of *Pyrus Aucuparia* 1400-2100 metres.

The importance of such measurements, with regard to the determination of the time required for the migrations of plants across a region, or to the study of the comparative effectiveness of the various adaptations for dispersal, will be sufficiently evident to any student of these subjects. It is plain, however, that many more examples from different regions would require to be studied before the data could be safely utilised in forming any generalisations. The scarcity of recorded examples may probably be ascribed to the great difficulty experienced in finding cases where seedlings can be with certainty traced to their parent plants.

A particularly favourable example has come under my notice in the north-eastern part of the county of Fife, on that stretch of fixed dunes known as Tentsmuir, between Tayport and the mouth of the river Eden. The moor is

¹ Fliche, 'Un Reboisement' ("Annales de la science agronomique," i., 1888).

Detailed accounts of the distances to which seeds may be expelled from those plants provided with mechanical devices for the purpose are given in works by Lubbock, Kerner, etc.; but, so far as I am aware, very few besides Fliche have sought to ascertain the distances to which seeds are carried by other than mechanical devices. Clement Reid, in his recently published work on the "Origin of the British Flora" (1899), p. 28, describes an interesting case of the dispersal of acorns by means of rooks, where the seedlings were found more than a mile from the parent plants.

roughly oblong in shape, five miles from north to south, and one and a half miles from east to west. It is made up of heath, pasture, marsh, and loose sand dunes, according to the prevalent conditions of soil and moisture. On the landward side a series of woods runs from north to south. These are mainly composed of Scots Pine and Birch, and some of the trees are of considerable age, many bearing an abundance of seed. They are freely exposed to the full force of the prevailing south-west and west winds, which before encountering them have an uninterrupted sweep over a number of miles of low, rolling country.

In the spring of 1899 a careful survey was made of the northern part of the moor on the eastern side of Fetersloch Wood. Although at first sight the moor appears to possess no higher vegetation than the uniform heather and heaths, a closer examination shows a number of young Pine and Birch trees a few feet in height. There is no record, so far as I am aware, that this part of the moor ever possessed mature trees, and the Ordnance Map of the year 1866 shows it to have been much the same as at present. There can be no reason for supposing that any one has planted these few and scattered young trees. Fetersloch Wood is the nearest possible source, and doubtless the true source, of the seeds which have given rise to them. The wind is the most likely agent of transportation, since both species are provided with seeds bearing winglike expansions. Since birds eat these seeds, they may aid in the dispersal; but it is unlikely that this has happened in the present case, where all the conditions are in favour of wind transportation.

The following observations were made at distances measured from the nearest point of the wood along a line running in a north-easterly direction. Although the measurements were made by pacing, they may be regarded as of sufficient accuracy for the present purpose:—

Yards.

1–48. Cones of Pine, and dead branches (absent beyond this point).
At 192. 2 Pines—

- (1) Height 7 feet, circumference 14 inches, about seventeen years old, in good condition.
- (2) Broken across, circumference 8 inches, still living.

Yards.

- At 266. 1 Pine, top broken, circumference $8\frac{1}{2}$ inches, still living.
 1 Birch, height 10 feet, circumference 8 inches, in good condition, bearing staminate catkins.
 „ 366. 1 Pine, height 3 feet, about ten years old.
 „ 489. 1 Pine.
 3 Birches, all in good condition.
 „ 746. 1 Pine, dead, about seven years old, in damp soil amongst *Erica Tetralix*.
 „ 771. 1 Pine, dead, about seven years old, in damp soil amongst *Erica Tetralix*.
 „ 837. 1 Pine, fourteen years old at least.
 „ 878. 1 Pine, height 5 feet, circumference $9\frac{1}{2}$ inches, in good condition.
 „ 886. 1 Pine, height 7 feet, circumference $16\frac{1}{2}$ inches, about 13 years old, in good condition.
 5 Pines, in good condition; these were not on the direct line of measurement, but near the last-mentioned example, and at much the same distance from the wood.

Beyond this point no trees were observed, the ground being composed of loose dunes, and in other ways unsuitable for the growth of trees.

These observations show that Pine seeds have been carried as far as 886 yards, and Birch seeds as far as 489 yards.

It will be observed that the trees occasionally occur in groups separated by long gaps. This is due to the nature of the ground, which is in the form of alternating ridge and hollow. The ridges are drier and more suitable for the growth of trees than the marshy hollows. The dominant vegetation on the ridges is usually *Calluna vulgaris*, while in the hollows *Erica Tetralix* is the most abundant. All the trees from 1 to 500 yards are associated with *Calluna vulgaris*. From 500 to 800 yards the ground is occupied by a broad marsh with *Erica Tetralix*, and there only two trees were found; both were dead, probably having succumbed to the damp nature of their habitat, which may perhaps have been drier while they lived. From 800 to 886 yards the association is again that of *Calluna vulgaris*, although with some *Erica Tetralix* mixed; and in this part eight of the trees were found.

The marshy nature of the ground is only one of the conditions which have prevented the moor from being naturally replanted in course of time by the abundant source of seeds in the old wood, with the prevalent westerly wind to transport them. The stunted growth of the trees—one of which is seventeen years old and yet only 7 feet high—and the frequency of broken tops and branches testify to the severity of climatic conditions. Sheep and rabbits nibble the young leaves; and every few years the heather is burnt by the game-preserved. When all the causes tending towards extermination are considered, it is surprising that even a few examples have managed to survive. These favoured few are mostly in spots which have escaped burning for a number of years; and the best grown specimens have been sheltered during their earliest years by the long heather around them.

Although 489 yards from the wood is the greatest distance at which any Birch trees were found, this is probably considerably under the distance to which the seeds may be carried. It might be suggested that a number expressing more accurately the maximum distance of transportation would be obtained by measuring the distances of seed-dispersal of those isolated young Birch trees which are common on some Highland moors.

The distance of 886 yards (810 metres) here determined as within the possible range for the dispersal of Pine seeds is very much greater than that of 115 metres given by Fliche. In his paper he contrasts the smallness of the distance to which Pine seeds are carried by the wind with the greater distances to which animals carry the seed of Beech (500–600 metres) and Rowan (1400–2100 metres); but if this new estimate for the Pine is accepted, this contrast can no longer be regarded as established. It is evident, from the disparity which exists between the few definite measurements yet published, that many more cases must be recorded before we can reach any degree of accuracy on the subject.

ZOOLOGICAL NOTES.

Marten in Argyllshire.—(*Mustela martes*).—Two Martens, male and female, were sent to Inverness, for preservation, by Mr. Campbell, Glensinnan, Argyllshire. They are in beautiful dark fur with orange-coloured throats. Mr. Campbell adds that he believes there are more of them in that neighbourhood. They were taken in the beginning of November.—T. E. BUCKLEY, Inverness.

Long-eared Bat in Elgin.—In May 1898 a fine example of *Plecotus auritus* was caught in a hollow tree in the oak wood near the town of Elgin, and was carefully preserved by Mr. Gordon Taylor, Bishopmill. As this species has not been recorded for Elginshire in Messrs. Harvie-Brown and Buckley's "Vertebrate Fauna," nor in the "Annals," I thought the fact worthy of notice.—WM. TAYLOR, Lhanbryde.

Bird Notes from Tiree and Coll.—In his notes on the Birds of Coll and Tiree, Colonel Irby gives the Partridge (*Perdix cinerea*) as nesting in Coll but not in Tiree. Partridges have nested in Tiree for the last six years, and there were several nests nine years ago. The Great Black-backed Gull (*Larus marinus*) is not mentioned as breeding in Coll. It breeds on Gunna, whence I have seen its eggs. A pair of Stonechats (*Pratincola rubicola*) nested this year in Tiree.—PETER ANDERSON, Tiree.

Marked Starlings.—On the chance of getting some information about the roading of the Starling (*Sturnus vulgaris*), I have commenced to mark Starlings here in Denmark, and this autumn I have marked 165 examples. The mark is a small ring with some letters and a number, placed on one foot of the bird. Possibly some of my Starlings will visit Britain, and therefore I take the liberty to ask you if you will take the trouble to interest yourself in my experiment (1) by publishing in the manner you think the most practical, and (2) by informing me of the capture of any of these marked Starlings, giving a description of the ring and its inscription, or, the bird being killed, by forwarding the marked foot with the ring to me.

Eventual results will in due time be published.—H. CHR. C. MORTENSEN, Adjunkt ved Katedralskolm, Viborg, Danmark.

[We have pleasure in making known Herr Mortensen's experiment and his request.—EDS.]

Black Redstart in the Solway Area.—An immature Black Redstart (*Ruticilla titys*) was shot upon the foreshore near Silloth, Cumberland, on 17th November, by a young lad in my service, whom I had directed to look along the shore with a gun. It was rather shy, and he spent about half an hour in trying to get a shot at it, before he secured it. It is only the second "Solway" specimen that I have examined in the flesh, and is the first that I have secured

for the collection of the Carlisle Museum. Perhaps I may be allowed to take this opportunity of reminding ornithological friends that I am leaving Cumberland at the end of the year. I hope to *continue* to study and record our Lakeland birds; letters directed to the care of the Carlisle Museum will continue to find me; but our *home address*, after 31st December, will be The Rectory, Pitlochry, Perthshire.—H. A. MACPHERSON, Allonby.

Grasshopper Warbler nesting in Morayshire.—The Grasshopper Warbler (*Locustella naevia*) is not recorded in Messrs. Harvie-Brown and Buckley's "Fauna of the Moray Basin" as nesting in the district; nevertheless it has done so for at least the last three or four years. In July 1896, and again in July 1897, I saw eggs in the possession of a schoolboy which he had got beside the river Lossie, near Elgin. I asked him to let me have the nest if he should find another, and in July 1898 he sent me a nest and an egg which he had obtained in the same locality. I had little doubt regarding them; but they have now been submitted to Mr. Harvie-Brown, and he is quite satisfied as to their identity.—ROBERT H. MACKESSACH.

Yellow Wagtail at Beaully.—On 11th July I saw a single specimen of *Motacilla raii* in the marshy meadows near the mouth of the Beaully River. This occurrence of the Yellow Wagtail is perhaps worth recording, as the exact status of the species in the North of Scotland seems uncertain. Messrs. Harvie-Brown and Buckley ("Fauna of the Moray Basin") have not seen it north of the Great Glen; Booth records it from Tain and Inverness; and St. John speaks of it as of rare occurrence in the county of Moray.—LIONEL W. HINXMAN, Edinburgh.

Great Gray Shrike in the Solway District.—A Great Gray Shrike (*Lanius excubitor*) was captured below Glencaple on 14th October. It was kept in a cage, but died in a few days. The bird afterwards came into my hands. It proved to be a female, and, from the vermiculated markings on the feathers of the breast, I conclude it is immature. This species is not nearly so frequently met with of late years as was formerly the case, when for a considerable period several were seen every winter.—R. SERVICE, Maxwelltown.

Kingfisher near the Beaully Firth.—A Kingfisher (*Alcedo ispida*) was shot on a small burn close to the Firth, near Lentrane, on 11th November. When a Kingfisher does visit that neighbourhood, it is almost sure to be found about that burn, where I have myself seen it on one occasion in August of last year.—T. E. BUCKLEY, Inverness.

Bee-Eater in Shetland.—For some days last week a strange bird was seen flying about at Symbister, and on Monday morning Mr.

Arthur Adie found the bird dead on the top of a wall there. It was sent to Lerwick, where it was identified as the Bee-Eater (*Merops apiaster*). The only specimen recorded as having been got in Scotland was one shot in the Mull of Galloway in October 1832. The bird is from ten to eleven inches long, and the plumage is exceedingly pretty. The Bee-Eater was sent down to Mr. John Irvine, who is having it stuffed.—“Shetland Times,” 10th June 1899.

[This bird has been seen or captured on about six occasions in Scotland.—EDS.]

The Long-eared Owl in Islay.—As there is no later record of the occurrence of the Long-eared Owl (*Asio otis*) in Islay than that contained in Harvie-Brown and Buckley’s “Fauna of Argyll,” in which there is an allusion to one having been shot on the island in February 1853, it may be interesting to state that a young male of this species was brought to me by Peter Currie, crofter, on 14th October last, which he had found in a trap at Duich Lotts. The bird was alive when found, but dead and too much damaged to set up nicely when I got it. It was sent on to Mr. John Paterson, Glasgow, by whom the identification has been confirmed. It is noteworthy that the find occurred on bare, peaty moorland, miles away from any kind of plantation or cover, such as this species usually frequents.—THOMAS F. GILMOUR, Port Ellen, Islay.

Forth.—An Old Record of the Kite in Fifeshire.—My friend Colonel H. W. Feilden has lately placed in my hands an interesting old letter, which, amongst other items, contains a record of the Kite (*Milvus iclinus*) in the county of Fife. The letter is dated from Cambo House, 22nd August 1844, and is from William Leyland Feilden—the present Baronet—who, at the time he wrote it, was nine years old. Colonel Feilden adds that: “There is no question about the correct identification of the bird, for it was stuffed and was for years after in my father’s collection. The passage in the letter is a short one, and as follows: “James shot a very fine Kite the other day: he had set about a dozen traps for it, and at last he shot it.” Colonel Feilden adds: “James, who shot the Kite, was James Forrester, the gamekeeper at Cambo House, Fifeshire.” I consider this an interesting record, and I would be pleased if any of our readers could give any earlier or later data of “The Kite in Fifeshire” or “Forth.”—J. A. HARVIE-BROWN.

Barnacle Goose in the Dornoch Firth.—A Barnacle Goose (*Bernicla leucopsis*) was sent from Tarlogie, near Tain, to Mr. Mackay for preservation on 9th November. As far as our present information goes, it is a rarity in that neighbourhood.—T. E. BUCKLEY, Inverness.

Long-tailed Duck in the Solway District.—Again this season I have to record the occurrence of *Harelda glacialis* in the Solway.

A fine female specimen came into my hands this autumn. In recent years the species, so abundant in north-western waters, has been finding its way round to our firth with increasing frequency.—R. SERVICE, Maxwelltown.

Smew and White-fronted Goose in Shetland.—I received from Mr. T. Henderson, jun., of Dunrossness, an immature Smew (*Mergus albellus*) shot on Loch Spiggie on 15th December: in the letter accompanying the specimen, Mr. Henderson informs me that he also shot a White-fronted Goose (*Anser albifrons*) on the 13th.—T. E. BUCKLEY, Inverness.

Red-legged Partridge in Forfarshire.—When shooting in Forfarshire on the 6th November, I saw a Red-legged Partridge (*Caccabis rufa*) shot: it was a male in fine plumage. The keeper said that he was aware of a pair being on the ground, and that he had seen a nest with eggs in the spring.—W. H. M. DUTHIE, Row, Doune.

Former presence of the Ptarmigan in Rum.—It may interest those who are studying the historic aspect of the past and present distribution of our native Scottish animals to know of an old record—which I do not remember having seen quoted—of the presence of the Ptarmigan on the island of Rum, as related in a somewhat uncommon book which is now before me, and for which I am indebted to my friend Colonel H. W. Feilden, who also drew my attention to the passage. The work is “The Life of Edward Daniel Clarke,” by William Otter, and the preface to the second edition bears date of 31st December 1824. This author is best known to general readers by his series of volumes entitled “Travels in various Countries of Europe, Asia, and Africa,” 11 vols. 1816-1824. But I am not aware that it is generally known that he made a voyage to Scotland and the Western Isles, as related in his “Life,” vol. i. chap. iv. p. 250. The passage referring to the Ptarmigan is as follows [I quote it fully, as I believe it possesses sufficient interest to Scottish naturalists generally]. Having described the great crater or corrie of Oreval—a mountain in Rum—and the ancient method of entrapping the Red Deer, Clarke goes on to say: “Mr. M. remaining in the crater with his gun to seek for game among the heath and morass, I continued my journey towards the summit. In my way up, among the loose stones near the top, those beautiful birds—the Ptarmigans—came so near me, and appeared so little alarmed at my intrusion, that I nearly took one of them with my hands. It appeared of a fine glossy dark colour, almost black, with a beautiful ring of the purest white round its neck.” [This sounds—says the reader—uncommonly like a misidentification.] Clarke then goes on to say: “They change their colour with every season of the year, and are seen alternately brown, gray, and white. Its most usual appearance is that of a dusky brown, like moorfowls”

[the italics are ours]. As the autumn draws to a close it becomes gray, and in the winter it is perfectly white. It never appears in the lower region, but almost always inhabits the tops." I add no remarks to the quotations given, preferring that they should stand as given.—J. A. HARVIE-BROWN.

Capercaillie in Strathnairn.—I may shortly state that, since the winter of 1894, I have introduced a considerable number of Capercaillie (*Tetrao urogallus*) from Norway and Austria. Thirty-one were turned down that year, and some every year since. A good many died on their first arrival, from insufficient pen room; but most of them have been turned out, and have remained in the woods round. I heard of three broods in 1897, and I knew of one in 1898: one, consisting of five young birds, was lately seen by a keeper near this house. A cock and a hen have this year strayed as far as Daviot. One of the broods (1897) was at Brin, where also a fine cock was shot by a keen young sportsman. Another, I believe, was killed at Aldourie, also a bird at Foyers. A hen, too, was unfortunately shot here last year by the subscriber. If the proprietors, shooting tenants, and keepers will kindly refrain from shooting them for some years to come, I feel sure that the large fir woods in this district will eventually form a most suitable home for them.—W. DALZIEL MACKENZIE, Farr, Inverness.

Spotted Crake in Inverness-shire.—A Spotted Crake (*Porzana maruetta*) was shot near Culloden about 30th September. Probably these birds are much commoner here than is generally supposed, but without a good dog they are not easily found.—T. E. BUCKLEY, Inverness.

Pratincole near Montrose.—I received for identification a young Pratincole (*Glarcola pratincola*), a bird of the year, which had been shot on the Mill Burn, Rocksands, Montrose, by Mr. Stormond, Henry Street, on the 4th of November 1899. It is a rare visitor to Britain, and has only been recorded for Scotland on one occasion, namely at Unst, Shetland, in August 1812.—J. A. HARVIE-BROWN.

Albino Lapwing in Inverness-shire.—Considering the enormous numbers of these birds, albinisms are not very common amongst them. Mr. Mackay showed me one that he had received from Mr. J. Carver, Crubenmore, near Dalwhinnie, on the 30th of September.—T. E. BUCKLEY, Inverness.

Spotted Redshank and Black-tailed Godwit in East Renfrewshire.—As the Spotted Redshank (*Totanus fuscus*) has been recorded only once from "Clyde" ("Annals," 1899, p. 51), it will doubtless be worth while to record its reappearance at Balgray Dam, East Renfrewshire, in the present autumn (1899). On 16th and 17th September a pair of birds has come under our observation. In a small creek on the west side of the dam a Common Redshank, a

pair of Spotted Redshanks, a pair of Greenshanks, and a few Lapwings were together. These we watched for a long time in a favourable light at a distance of about twenty paces. The Spotted Redshanks were in spotted and dusky, but changing plumage, the white stripe from the bill to the eye being well defined. Their call note, though very distinct, seemed to resemble considerably that of the Common Partridge. Early in September M'Culloch and Son, Sauchiehall Street, Glasgow, received a Black-tailed Godwit (*Limosa belgica*) to preserve. On inquiry, this specimen was found to have been shot by Mr. Gilmour of Barrhead, near Caldwell, in Neilston parish, a little beyond our limits; but on 21st September we had several good views of a second example at Balgray Dam. Both of these were birds of the year. The note of the Balgray bird was a "kip," occasionally uttered once, but usually repeated, similar to a note emitted by Black-headed Gulls when quarrelling among themselves.—JOHN PATERSON and JOHN ROBERTSON, Glasgow.

Black Tern in the Firth of Forth.—On the 7th of August last I saw a Black Tern (*Hydrochelidon nigra*) near Aberlady. It hawked about for some time, keeping mainly to the course of the Peffer Burn, and then disappeared over the trees near the bridge. The bird was in adult plumage.—T. G. LAIDLAW, Edinburgh.

Sharks in the Moray Firth.—On Saturday, 7th October last, a large male Basking Shark (*Selache maxima*) was stranded at Kingston, and was said to have lived twenty hours after, as it lay on the beach near high-water mark. It was a full-grown animal, and probably an old one. It measured—total length, 30 feet; girth, 14 feet; length of pectoral fin, 6 feet; breadth, nearly 4 feet. The first gill-cover was $6\frac{1}{2}$ feet long; claspers, nearly 4 feet long; and the tail was $6\frac{1}{2}$ feet across. Hundreds of people went to see it. Mr. Muirhead of Fochabers and others took photographs of it. Several newspapers had it reported as a whale! Another Shark, probably of the same species, was seen alive within three miles of the same place, and near the shore. The Porbeagle (*Lamna cornubica*) has been common in the Moray Firth during the past year. Two were stranded at Nairn in September last, and one east of Lossiemouth last year.—WM. TAYLOR, Lhanbryde.

Larger Spotted Dog-fish in "Clyde."—The "North British Daily Mail" of 11th December contained a paragraph stating that the Girvan great line boats fishing off Lendal on the 9th had caught seven Dog or Hound Sharks; some measured about five feet in length and twenty-four inches in girth, and the females were full of well-developed eggs. The paper further stated that the species is known as hound dog-fish or rock-shark, *S. catulus*. On communicating this to Mr. Thomas Scott, F.L.S., he writes me: "This record is of special interest, because the species is a rare one in the Clyde; so much so

that I was inclined to doubt whether I should admit it amongst my Clyde species."—HUGH BOYD WATT, Glasgow.

Carabus monilis, *F.*, in "Clyde."—Mr. John Dunsmore has shown me a specimen of this beetle which he captured near Paisley. I submitted the specimen to the Rev. Alfred Thornley, and he has stated that the identification is correct. *Carabus monilis* has hitherto had only an insecure position on the Scottish list. It is included in Wilson and Duncan's "Entomologia Edinensis" (1834), with the following remark: "Rather scarce; it has been taken near Coates, immediately to the west of the New Town." In Murray's "Catalogue of Scottish Coleoptera" (1853) there are two records: "Near Edinburgh, Sir P. Walker," and "Granton, Mr. R. Logan." Dr. Sharp was evidently not sure about these records, as in his "Catalogue of the Coleoptera of Scotland," which is the standard list of Scottish Coleoptera, the species is bracketed as a doubtful one.—ANDERSON FERGUSON, Glasgow.

Xantholinus fulgidus, *F.*, in "Clyde."—On 22nd April 1899 I took a specimen of *Xantholinus fulgidus* amongst rubbish in a sand-pit at Tollcross, near Glasgow. This species does not appear to have been recorded for Scotland. It is not given a place in Dr. Sharp's "Catalogue of the Coleoptera of Scotland." I am indebted to the Rev. A. Thornley for confirming my identification of the beetle.—ANDERSON FERGUSON, Glasgow.

Destruction of hibernating Tortoise-shell Butterflies by the Common Wren.—For some years past a rather large number of hibernating Tortoise-shell Butterflies (*Vanessa urticae*) have come into the house here in autumn for winter quarters, and I have always protected them. This year there was a larger number than usual, there being upwards of twenty specimens on the walls and ceiling of an inner passage, in what may be described as clusters of four or more together, and there were many others in rooms. In November I began to notice detached wings of *urticae* lying about, and I saw that the butterflies were rapidly disappearing. I was not long in finding the cause of this destruction, for in going into a room where the window was raised for airing, a Common Wren (*Troglodytes parvulus*) flew on to the inner sill of the window with a butterfly in its mouth. On going forward, it left it, still alive, but with the head neatly decapitated. Since then it has found its way by open windows into every room in the house, until not a single *Vanessa urticae* remains. If this is a general habit of the Common Wren, it is not to be wondered at that the finer species of the *Vanessidae* are comparatively scarce. It would be interesting to hear if any of your readers have had a similar experience.—A. ELLIOT, Caverton, Roxburgh.

Nyssia zonaria, *Schiff.*—In Mr. Evans's note in the "Annals" for October last, on the occurrence of this moth in the Hebrides, in place of 1847 (twice) and 1849, read 1844 and 1845.

The Death's-head Moth in the Solway District.—Concerning the unique occurrence of numerous larvæ of this great moth (*Acherontia atropos*), I have now to record several interesting captures. One was found beneath a lilac bush, from which it had evidently tumbled, at Cassalands, Maxwelltown, on 30th August. Four days later another was found feeding on a lilac tree at Rotchell Park, not far away from the first-named locality. On 6th September I received a third larva from Meikle Cloak, near Dalbeattie. A particularly fine larva was next shown to me that had been found on lilac growing in the garden at Brannetrigg, in Kirkgunzeon. Finally, a fifth example came to me from Preston farm, in Kirkbean. This one was in the pupa stage, and had been turned up when digging potatoes. It had been injured in some way, and soon died. I hear that several of those first found at Rockcliffe safely reached the chrysalis stage. Whether they will get through to the final and perfect state is another question. Altogether the hitherto unrecorded finding in Scotland of such a long series of the insect in stages that show incontestably that they were born here is a fact of considerable scientific value in the history of an insect that is always regarded with great interest.—R. SERVICE, Maxwelltown.

Humming-bird Hawkmoth in Edinburgh District in 1899.—With reference to my note ("Annals," July 1899) on the unusual numbers of *Macroglossa stellatarum* observed in this district last June, it may be worth while putting the following subsequent occurrences on record, namely:—24th June, one seen at Aberlady; 30th August, three at geraniums in a greenhouse, Newbattle Terrace, Edinburgh; end of August, one at wallflowers, Stobo; September, one, parish of Stenton, East Lothian; 18th September, one caught at fuchsia in a greenhouse, Restalrig Terrace, Leith; and 28th October, one captured by my son as it hovered over a low wall in Morningside Place, Edinburgh. The last-mentioned example had all the appearance of an insect quite recently emerged from the pupa stage, and was no doubt bred in the neighbourhood. Those obtained by me in June were not so fresh looking (some, indeed, were considerably worn), and must, I am inclined to think, have been mainly immigrants.—WILLIAM EVANS, Edinburgh.

Andrena fuscipes, *Kirby*, in Inverness-shire.—Among my specimens of Hymenoptera Aculeata, there is one which Mr. Edward Saunders has named for me *Andrena fuscipes*, ♀. It was captured at Kinraig, near Kingussie, Inverness-shire, in August 1893. I omitted to include this record, which would seem to be the first of the species for Scotland, in my notes on some Scottish Aculeates

in the July 1899 number of this journal.—WILLIAM EVANS, Edinburgh.

***Sirex juvenicus*, Linn., in Moray.**—A female of this Saw-fly was picked up on 13th September last by a workman engaged near the harbour at Hopeman. A foreign ship was in the harbour, and the finder thought the insect had flown from the vessel. This seems likely, as Hopeman is not a well-wooded locality.—HENRY H. BROWN, Elgin.

***Sirex juvenicus* in Dalmeny Woods.**—This wood-boring insect, which is evidently extending its range in Scotland, made its appearance in considerable numbers among some ripe Scotch fir in the Warrens plantation, Dalmeny Park, in the autumn of 1899. The borings were not noticed until the trees were felled, and the insect itself was not got until the wood was being cut up. Large numbers of this *Sirex* were then brought to light, in all stages of development. The female insect was much more common than the male, which is distinguished by its smaller size and red abdominal band. In eating its way out the insect makes a formidable curved tunnel in the wood, generally about 5 inches long, and of the diameter of a pencil. *Sirex juvenicus* has not previously been recorded in Linlithgowshire.—CHARLES CAMPBELL, Dalmeny Park.

***Sirex gigas* in Forfarshire.**—I beg to inform you of an occurrence of *Sirex gigas* at Craigendowie, in the parish of Lethnot, Forfarshire, on 11th August last. A schoolboy who had been loading fire-wood—chiefly larch—saw two specimens, which seemed to rise from the timber. One of these—a female—he brought me; the other was permitted to escape. Not having seen the insect before, I sent it to Dr. T. F. Dewar, B.Sc., Arbroath, who was kind enough to identify it for me. I have since thought that as there were, about two years ago, extensive structural alterations on a farmstead about a mile away, the insects may have been brought to the district in the larval state in the timber required then.—T. GRAY PHILIP, Edinburgh.

***Boreus hiemalis* (L.), in Lanarkshire.**—On 2nd December 1899, while searching for spiders in Braidwood Glen, near Carluke, Lanarkshire, I found a female of this odd-looking Neuropterous insect. So far as I can discover, there is no previous record of the species for the Clyde area. In addition to the Scottish occurrences mentioned in my note in the "Annals" for 1897 (p. 49), a female was taken at Clova, Forfarshire, in April 1895 ("Ent. Mo. Mag." (2), vol. vi. p. 240). The first Scottish record of the insect appears to be that for Berwickshire, by the late James Hardy of Oldcambus, in "The Zoologist" (1848), p. 2175.—WILLIAM EVANS, Edinburgh.

BOTANICAL NOTES AND NEWS.

Stellaria nemorum, L., and *S. aquatica*, Scop.—Although in Scotland the first-named species does not seem to be recorded farther north than $57^{\circ} 30'$, there seems no reason why it should not be found, and I think it probable that it was this plant that was found by Robert Dick (Smiles's "Life," p. 338) on the banks of the river Thurso.

In Lapland it was found at Kølle, $70^{\circ} 55'$ N. Lat., by Mr. P. Sewell!; it occurs in Finland and Russian Lapland up to $69^{\circ} 40'$; "abundant in the birch region at Kōngäs and at Menikka, $69^{\circ} 26'$ " (Wainio, in "Flora Lap. find.," 1891, p. 61). In Sweden, extending up to Nordland; in Norway; in South and North Norway up to $71^{\circ} 7'$ (Magerø); and last, Finmark.

In the "Compend. Cyb. Brit.," p. 122, 400 yards is given as its highest elevation in Britain (Humber); but the Rev. E. S. Marshall found it in 1892 at 3000 feet in Aberdeen¹: so that its altitudinal range is considerable.

Stellaria aquatica, Scop., entered by Lowe among the plants of Orkney, does not extend so far north as *nemorum*. I have seen specimens gathered by Messrs. Stirling and Kidston in Stirlingshire, and it is reported from Lanark, Roxburgh, and Forfar; but I know of no recent confirmations of these counties. In Finland this occupies a belt extending up to 62° N. Lat., and from about 20° to 38° E. Long. In South Norway it extends only to $63^{\circ} 28'$; and in Sweden north to Gefleborgs län about 62° .

In Russia it extends north to the Government of St. Petersburg, while *nemorum* extends to the Kola peninsula (67° N. Lat.).

Both occur in Denmark; but neither is recorded from the Faroes or Iceland.

Only *nemorum* appears in Sir J. D. Hooker's "Outline of the Distribution of Arctic Plants." Of this, written forty years ago, we much want a new edition.

Thus *aquatica* seems to bear out elsewhere its climatal distribution in Britain.

I trust that any botanist going far north in Scotland will keep these two plants in his mind.—A. BENNETT.

Spergula arvensis, L., in Scotland.—Mr. G. Nicholson drew attention in 1880, in the "Journal of Botany" (pp. 16-19), to the forms that occur in Britain, and stated that of the two (*sativa* and *vulgaris*), *sativa* alone was known to him from Scotland, where he had sought for *vulgaris* in the shires of Edinburgh, Perth, and Aberdeen without success. Mr. G. C. Druce, in the "Journal of Botany" in 1889 (pp. 173-175), named a large number of counties of

¹ "Journal of Botany," p. 229, 1893.

Scotland in which he had found *sativa*; and stated that he had not seen an example of *vulgaris* from Scotland. In the "Flora of Dumfries," published a few years ago by Mr. Scott-Elliott, *vulgaris* is mentioned as having been gathered in Wigtownshire in 1872 by Mr. F. R. Coles; and in the "Flora of Perthshire" Dr. F. Buchanan White (in MS. written probably about 1890) says it "has been noticed in several places, and is probably widely diffused."

I have been on the watch for it since 1875 in the north-east of Scotland; but unsuccessfully until 1894. In that year, in August, I found two or three plants growing on the filled-up bed of the river Dee, among the numerous strangers of which I have given some account several times in this journal in "A Florula of a Piece of Waste Ground." I next met with a few plants in a turnip-field in the parish of Nigg, a mile or two south of Aberdeen, in September 1896, and one plant, a few days later, on the site of a road-metal heap at Persley, about two miles north-west of Aberdeen. I did not again find it until September 1899, when I came on one plant beside the river Dee, at Cults, about four miles west of Aberdeen, and two or three on rubbish thrown down to fill a sandpit close to Old Aberdeen. It will be observed that I have not seen *vulgaris* in Scotland earlier than the month of August; and I have not found it bearing *ripe* seeds in noticeable quantity until nearly the end of September or in October. It thus appears to be markedly later than *sativa* in ripening its seeds; but that will scarcely account for the remarkable abundance of *sativa* and the scarcity of *vulgaris* in Scotland. Both are so completely weeds of cultivation in Scotland that one cannot doubt their introduction by human agency. If we look to their distribution beyond our islands, *sativa* is the more northern in its chief prevalence, though the two overlap so largely that it is scarcely warrantable to attribute the scarcity of *vulgaris* in Scotland to merely climatic conditions. May it not be that the prevalence of *sativa* indicates a northern source in Europe for the plants cultivated in Scotland in earlier times. Near Aberdeen, at any rate, *vulgaris* seems even now to be more a casual than a colonist. It would be interesting to know whether it has been observed elsewhere in Scotland than in the four counties noted above (Wigtown, Perth, Kincardine, S. Aberdeen), and, if so, under what conditions. The sticky gland hairs giving a gray tint to the green of *sativa* are in so marked contrast to the nearly hairless bright green of *vulgaris*, that the latter plant readily catches the eye as different from the former. If the seeds are ripe or nearly ripe, there can be no difficulty in arriving at certainty; the black, merely rough seeds of *sativa*, ringed with a paler membranous wing, being very different from the wingless seeds of *vulgaris* covered with short clubbed hairs or papillæ, the tips of which are at first pale (and then contrast with the dark seed), but become darker as the seed grows

older. *Sativa* appears to be an almost ubiquitous weed of agricultural ground in Scotland; but of the distribution of *vulgaris* in the country so much less is known that any information will be welcome.—JAMES W. H. TRAIL.

CURRENT LITERATURE.

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—October-December 1899.

[The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors will have access to the sources of information undermentioned.]

ZOOLOGY.

ON THE PROTECTION OF WILD BIRDS IN PERTHSHIRE. By Col. Campbell. *Trans. Perthshire Soc. Nat. Science*, vol. iii. part i. (1898-99), pp. 18-25.

SOLITARY SNIPE IN KIRKCUDBRIGHTSHIRE. A. E. W. *The Field*, 21st October 1899, p. 667.—Young bird killed near Castle-Douglas.

A WHITE CURLEW. By C. Boyd. *The Field*, 21st October 1899, p. 667, and 28th October 1899, p. 708.—Specimen said to have occurred on the shore of Dornoch Firth.

OPAH (LAMPRIIS LUNA) OFF SCOTLAND. By F. W. Frohawk. *The Field*, 21st October 1899, p. 668.—Particulars given of a specimen caught off Rockall on 7th September last.

LEPIDOPTERA IN MORAY. By Henry H. Brown. *Entomologist*, vol. xxxii. p. 279 (November 1899).—Refers to *Pyrameis atalanta*, *Lycæna phlœas*, *Manduca (Acherontia) atropos*, *Phlegethontius (Sphinx) convolvuli*, and *Macroglossa stellatarum*.

ANERASTIA LOTELLA, HB., AND CRAMBUS LATISTRIUS, HW., ETC., IN THE WEST OF SCOTLAND. By A. A. Dalglish. *Entomologist*, vol. xxxii. p. 306 (December 1899).

LITHOCOLLETIS CONCOMITELLA, SP. N., AND ITS NEAREST ALLIES. By Eustace R. Banks, M.A., F.E.S. *Ent. Mo. Mag.* (2), vol. x. pp. 241-255 and 284-288 (October-December 1899).—Numerous references are given to Scottish localities.

COLEOPTERA AT BOAT OF GARTEN, STRATHSPEY, INVERNESS-SHIRE. By Professor T. Hudson Beare, B.Sc., F.R.S.E. *Ent. Mo. Mag.* (2), vol. x. pp. 267-268 (November 1899).

QUEDIUS TRISTIS, GRAV., IN SCOTLAND. By William Evans. *Ent. Record*, vol. xi. p. 338 (December 1899).—Refers to note by

Professor Hudson Beare in the September number of the same magazine, and reports the capture of this beetle in a number of localities in the Edinburgh district during the past twelve years.

HYPERA ELONGATA, PAYK., CONFIRMED AS BRITISH. By Professor T. Hudson Beare, B.Sc., F.E.S. *Ent. Record*, vol. xi. pp. 334-335 (December 1899).—A specimen captured near Edinburgh in July last. A history of this insect as regards its previous occurrence in Great Britain is given.

SIREX JUVENCUS IN MORAY. Henry H. Brown. *Entomologist*, vol. xxxii. p. 283 (November 1899).—Female taken on 13th September at Hopeman.

TWO SPECIES OF ACULEATE HYMENOPTERA NEW TO BRITAIN. By Edward Saunders, F.L.S. *Ent. Mo. Mag.* (2), vol. x. pp. 262-264 (November 1899).—One of the species referred to is *Colletes montanus*, Mor., of which three males and one female were taken on Irvine Moor, near Glasgow, on 8th July, by Mr. A. A. Dalglish.

SOME REMARKS ON THE TWO SPECIES OF DIGLOSSA, HALIDAY, OCCURRING IN BRITAIN. By T. C. Champion, F.Z.S. *Ent. Mo. Mag.* (2), vol. x. pp. 264-265 (November 1899).—*D. mersa* stated to occur in the Forth and Clyde districts.

NEUROPTERA AND TRICHOPTERA OBSERVED IN WIGTOWNSHIRE DURING JULY 1899, INCLUDING TWO SPECIES OF HYDROPTILIDÆ NEW TO THE BRITISH LIST. By Kenneth J. Morton, F.E.S. *Ent. Mo. Mag.* (2), vol. x. pp. 278-281 (December 1899).

A GUIDE TO THE STUDY OF BRITISH WATER-BUGS (AQUATIC RHYNCHOTA)—continued. By G. W. Kirkaldy. *Entomologist*, vol. xxxii. pp. 296-300 (December 1899).—Numerous references are given to Scottish localities.

LIST OF THE RHYNCHOTA OF PERTHSHIRE. By T. M. M'Gregor and G. W. Kirkaldy. *Trans. Perthshire Soc. Nat. Science*, vol. iii. part i. (1898-99), pp. 1-5.—Fifty-two species are recorded.

BOTANY.

SOME PLANTS OF EAST SCOTLAND. By Rev. E. S. Marshall M.A., F.L.S., and W. A. Shoolbred, M.R.C.S. *Journ. Bot.*, 1899, pp. 383-389.—Relates to collections made in Elgin (95), "East Ness" (96), and East Ross (106), and includes several new vice-county records.

NOTES ON NORTH UIST PLANTS, ETC. By W. A. Shoolbred, M.R.C.S. *Journ. Bot.*, 1899, pp. 478-481.—Among numerous notes on plants of North Uist, gives some new vice-county records, and a supplementary list of new records from Skye, West Ross, and Argyll.

REVIEWS.

THE HISTORY OF THE EUROPEAN FAUNA. By R. F. Scharff.

This is a reproduction in book form of a paper which appeared not very long ago in the "Proceedings of the Royal Irish Academy" (3rd Ser. vol. iv., 1897), and which has now been altered so as to suit its present more popular form. It is an example of modern methods of attacking the problems of the geographical distribution of life upon our globe—methods which certainly compare very favourably with those which are to be found in some other recent but only professedly up-to-date publications.

In the space at our disposal it is impossible to give the book anything like the review it deserves. We may, however, point out that the author's object is to split the members of the European fauna and flora into their various component groups, whose birthplaces he then traces to other parts of the world, and in addition indicates the probable paths by which they advanced to their present habitat. The British Isles are taken as a sort of convenient index area to Europe, so that no British naturalist, whether or no he agrees with Dr. Scharff, can afford to ignore his work. In fact, Dr. Scharff's book must prove a most valuable work of reference even to the bitterest opponents of his theories. Absolutely free from errors no one could expect it to be; but it is, without doubt, a most straightforward and conscientious attempt to grapple with some of the most interesting problems which a naturalist has to face, and which will undoubtedly help the advance and influence the direction, in its widest and best sense, of the study of the Geographical Distribution of Animals.—G. E. H. B. H.

AN ILLUSTRATED MANUAL OF BRITISH BIRDS. By Howard Saunders, F.L.S., F.Z.S., etc. Second Edition, revised. (London: Gurney and Jackson, 1899.)

The chief ornithological event of the year which has just closed has been the completion of the new edition of Saunders's "Manual."

The first edition was issued in 1889, and by sheer excellence, coupled with utility, it deservedly took a first place among books on British birds; and thus a very large edition (several thousands of copies) was sold in less than a decade—very practical appreciation of an excellent book. However good the first edition of this work may have been, and was, this second edition is immeasurably superior in every respect. It has been revised with the most painstaking care, is up to date in all respects, and has been enriched with no less than twenty new and acceptable illustrations—some of new British species, while others replace not very satisfactory portraits. Such a well-known and highly appreciated work needs no recommendation at our hands, but we desire to offer Mr. Saunders our most hearty congratulations on the completion of

his labours, and to express our admiration at the manner in which he has accomplished a most arduous and difficult task.

We hope now that Mr. Saunders will turn his attention to the larger work which has become a desideratum—for British ornithology, and our knowledge of British birds in all lands, grows apace—namely, a new edition of Yarrell's "British Birds," by the author who has proved himself to be on all occasions such an able exponent of the subject.

A LIST OF BRITISH BIRDS BELONGING TO THE HUMBER DISTRICT (HAVING SPECIAL REFERENCE TO THEIR MIGRATIONS), REVISED TO APRIL 1899. By John Cordeaux, J.P., F.R.G.S., M.B.O.U., etc. (London: R. H. Porter, 1899.)

Since this valuable and acceptable List was issued, its author, one of the most excellent of men, has passed from among us. It is his last published work. The loss of John Cordeaux to British Natural History is a great one. Equally great is the loss sustained by a host of his friends, for he was no ordinary man to those who *knew* him. Possessed, beyond most, of those rare qualities which make a man lovable as well as honoured, he won our affectionate regard as well as our great respect and admiration. We desire to place on record this little tribute to the memory of our old and valued friend and able colleague—one with whom we have been so intimately, so pleasurably, and so advantageously associated for so many years.

The List, it is almost unnecessary to state, is an admirable one. It treats of one of the most interesting faunal areas in Britain, and is written by him who was associated with it through a lifelong connection as a naturalist—one, too, who was unrivalled as an observer and as an authority on the subject of migration. Although it contains only 40 pages, it treats of no less than 322 species, and tells us all that is essential concerning their status and their migrations. It is a valuable contribution to British ornithology and to the phenomenon of bird-migration, as observed on our coasts, and is indispensable to all who are interested in these subjects—and they are many.

BIRD LIFE IN AN ARCTIC SPRING. The Diaries of Dan Meinertzhagen and R. P. Hornby. (London: R. H. Porter, 1899.)

A reviewer of this little tribute of parental affection has no easy task. Snatched away at the age of twenty-three, Mr Meinertzhagen had shown that he possessed the inborn genius of a naturalist, while his education and position gave promise of a brilliant career. It is not expressly so stated, but we may perhaps presume that his desire to see for himself the home of so many birds which rarely or never breed with us led him northward as it has led others; for assuredly the *incunabula* of the species which yearly winter in these

islands must always have great interest for every British ornithologist. The diarists set out on this quest in a very practical fashion. Instead of travelling northward with the returning birds, they started early and anticipated the arrival of the subjects of their observation. Thus, reaching Tromsö on the 6th April, they proceeded to Skibotten on the Lyngen Fjord, and crossed the watershed to Kilpisjärvi, whence flows the Muonio to the Baltic, arriving at Muoniovara on the 16th, just before the winter-ways became impassable. Making their headquarters at Muonioniska, the travellers stayed, "off and on," till the 24th June, then retracing their steps to Tromsö—wherein lay, we think, a mistake, for a fortnight longer would have largely increased their results. However, they were by no means idle, and Mr. Meinertzhagen alone pushed on to the north-east so far as Peldouoma, over as desolate and as rough a tract of country as any one would wish, passing, apparently without knowing it, close to the very spot where, more than forty years before, the first Waxwing's nest was found by Wolley's people.

He seems to have been satisfied with the spoils he obtained, but most of the eggs collected appear to have been bought from the country-people, and at exorbitant prices. We wish we could add that he had increased our knowledge of the fauna of the district he visited; but we are unfortunately unable to accept those species he names, which have not before been recorded as observed in it—the Moor-hen, the Barn Owl, and the Middle-spotted Woodpecker. The last rested on the "authority" (save the mark!) of a man who brought him some eggs, and may at once be discarded; but the other two birds he says he himself saw. Both must have been familiar to him; but in each case we fear he was mistaken—even as young and ardent ornithologists sometimes are. Had he obtained a specimen of either, it would be a different matter; but he was evidently unaware of the fact that neither species, according to previous information, had ever approached the latitude of Muonioniska—the Barn Owl not by a thousand miles. The same disregard of their geographical range made him also lend too credulous an ear to the stories told him of the Pigmy and the Ural Owl—the last having been only once before observed in Lapland. The bird spoken of by his informant was evidently a Lapp Owl. The suggestion of the occurrence of *Anthus cervinus* and *Phylloscopus borealis* is very vague. Both, for what one knows to the contrary, may inhabit that part of Lapland, but the fact that they do so is undetermined.

It is admittedly difficult to decide how a diary like that of Mr. Meinertzhagen's should be printed, for it was certainly not written for publication. In the preface we are told that this is intended to be "an exact copy of the manuscript"; but surely it has not been accurately copied, for we cannot bring ourselves to believe that the

lamented author ever wrote that he found in the œsophagus of a Greenshank "a pike over three inches long" (page 53)! It is to careless transcription, we are inclined to think, that many of the most terrible misspellings in the names of things, places, and persons may be due—that of Wolley among the last. A knowledge of the Finnish language is certainly not to be expected of all, but still there are good maps to be had, and from them the names of localities might have been correctly written down, instead of being given in such a way as to make it hard to follow the travellers' footsteps, to say nothing of the ridicule it will bring from foreigners, and the pain it causes to a conscientious reviewer, anxious to appreciate the toil (often excessive) voluntarily undergone by one whose untimely fate all true naturalists must deeply deplore. In justice to his memory, it is a great pity that the publication of his diary was not supervised by some one with a competent knowledge of Scandinavian ornithology.

INSECTS, THEIR STRUCTURE AND LIFE. By George H. Carpenter, B.Sc. Lond. (London: J. M. Dent and Co., 1899.)

A very few years ago the British student of Entomology could justly complain of the absence of any *good* general text-book of his subject at a reasonable price, or indeed at any price. Now, however, he is in a more fortunate position; for, while the work of Dr. Sharp, noticed above, and the similarly got-up volume by Dr. Packard on Insect-Anatomy may serve the more advanced student (or the wealthier), the handy little text-book of Mr. Carpenter, just published, furnishes an excellent and a *cheap* introduction to the subject. For the very modest sum of 4s. 6d. the youthful lover of insects can here obtain a thoroughly reliable account of all the Orders. The book is divided into six chapters, the first four of which are devoted to (1) the Form, (2) the Life-History, (3) the Classification, and (4) the Orders of Insects respectively, while the last two are occupied with a consideration of the relations of these creatures to their surroundings, and their pedigrees. At the end of the volume is appended a very useful classified list of papers on special branches of the subject. The book is well printed and amply illustrated, though some of the figures have suffered somewhat through the roughness of the paper.

P. H. G.

THE GLASGOW CATALOGUE OF NATIVE AND ESTABLISHED PLANTS: BEING A CONTRIBUTION TO THE TOPOGRAPHICAL BOTANY OF THE WESTERN AND CENTRAL COUNTIES OF SCOTLAND. Second Edition. (Glasgow: Peter Ewing, F.L.S., The Frond, Uddingston, 1899.)

In an unpretentious form, Mr. Ewing has brought together the results of many years' observations by himself, and the contributions of botanical friends, in so far as relates to the counties of the West

of Scotland north of Wigtown. These are : Ayr (75), Renfrew (76), Lanark (77), Stirling (86), Westerness (97), Argyll (98), Dumbarton (99), Clyde Isles (100), Cantyre (101), South Ebudes (102), Mid Ebudes (103), North Ebudes (104), West Ross (105), Hebrides (110). He explains that "great care has been taken in recording and re-recording the plants for which local botanists are responsible." All plants forming new records have been seen by himself, and most of them have been seen by Mr. Arthur Bennett. "A free use of '?' has been made, though in most cases this does not mean much. Occasionally it is used to express a doubt as to the plant's occurrence in a certain county." This mode of using the query leaves the reader uncertain as to whether the occurrence in a county is, or is not, seriously questioned by the author.

With respect to the vexed question of what plants should be admitted as "natives," Mr. Ewing explains in the introduction that : "I have come to the conclusion that, as all our vegetation seems to have developed subsequent to the Great Ice Age, the question simply is, how long must a plant be established before it can be regarded as a native? The words 'casual,' 'alien,' 'colonist,' and 'native' look well in books, but they do not seem to me to be of much practical value so long as this remains undetermined. . . . I have tried to eliminate all plants recorded for places where they have not the power to establish themselves." It is certainly no easy matter to judge aright of the claims of many species to a place in our flora ; but the greater number of botanists would hesitate to include in a flora of Scotland, without note or indication of any kind, such plants as, e.g., *Clematis Vitalba*, *Helleborus viridis*, *H. fœtidus*, *Aconitum Napellus*, *Hesperis matronalis*, *Erysimum cheiranthoides*, *Camelina sativa*, *Brassica Napus*, *B. Rutabaga*, *B. Rapa*, *Lepidium sativum*, and many others. If some of these are to be admitted unquestioned, it is hard to see why others should be excluded from all mention, as mere casuals.

No attempt has been made in the "Catalogue" to indicate the advancement in the knowledge of the West of Scotland flora, or to note which are new records and which are confirmations of records already extant. A recognition of the actual additions to previous published records that have been made in this work requires previous study of the topographical botany of Scotland. The amount of labour that has been devoted to the book, small though it is, and the large amount of information that it affords to those qualified to make use of it, will be gratefully recognised by all those interested in such studies. The exceedingly small price (2s.) puts it within the reach of every one.

We hope that it will meet with such a reception that a new edition will be soon called for, and that Mr. Ewing may thus have the opportunity of adding to its usefulness and of correcting occasional misprints in the scientific names.

The Annals of Scottish Natural History

No. 34]

1900

[APRIL

NOTES ON THE MARINE MAMMALS OF THE NORTH-EAST OF SCOTLAND.

By WILLIAM TAYLOR.

CETACEA.

NO whales of the genus *Balæna* nor of the genus *Megaptera* (except one at Wick in 1871) have been captured or stranded in the north of Scotland for many years.

Whales of the genus *Balænoptera* are not so uncommon, but I fear one species has sometimes been mistaken for another. By far the commonest species stranded and captured on our coasts, of late years, is *Balænoptera rostrata*, the Pike Whale, and not *Balænoptera musculus*, the Common Rorqual. I know of no recent records of *Balænoptera sibbaldii* nor *Balænoptera borealis*, unless one or both of these species have been mistaken at times for the Common Rorqual. A maxillary bone sent from Burghead a few years ago was identified by Sir William Turner as belonging to *Balænoptera sibbaldii*.

BALÆNOPTERA MUSCULUS (Common Rorqual).—Several specimens of the Common Rorqual have been stranded near Nairn and Inverness within the past thirty years. There is a remarkable note in the Wardlaw Manuscript, written in

1664, which may refer to this species. "1660. The next September a formidable big whale came up the Frith, and struck upon the shores be-east Inverness a mile. It was seventy feet long; I was present at the measuring of it. The debate began, whether it was upon Culloden's march or the Town's; but the burgesses of Inverness seized the whale under appreciation, John Forbes of Culloden being then at the south. The English offered to buy her at a high rate, and they should have got her by right, for all men concluded the whale to be a presage of the garrison's expiration and translation from Inverness, which happened shortly after."

PHYSETER MACROCEPHALUS (Sperm Whale).—No record of a Sperm Whale, except the Thurso one in 1863, is known to me. Sometimes the newspapers report a "Sperm Whale," but, when proper inquiry is made, it generally turns out some other species.

HYPEROODON ROSTRATA (Bottlenose).—This is one of the most abundant species, from the Moray Firth to Shetland.

MESOPLODON BIDENS (Sowerby's Whale).—This species has been found four times in the Moray Firth near Nairn. The first, in 1800, was the "type" of the species. I think the last two specimens found deserve more than a passing reference. I sent a notice to the "Annals" of a male Sowerby's Whale which was stranded near Nairn in September 1896. I now have to record the stranding of other two in September 1899, both females, mother and young. The young one stranded about the spot where the male came to grief three years before, and the mother about a mile east of that place.

It is very desirable that descriptions should be given of rare mammals, as these often show curious sexual and even individual variations, for by so doing we may be able to prevent the species-maker giving new names to animals which are not even well-marked varieties. A marked departure in the colour of the belly of a whale, or even of a mouse, has been considered by some as evidence of specific value, though it can be proved that such departures are, in most cases, only "individual variations." Sowerby's type

specimen had all the under parts white, and was black or blackish above ; not "white *above* and black *beneath*" as mentioned in Mr. Lydekker's book on British mammals. Both the adults, male and female, that I found were black all over ; but as proof that they are not even varietally distinct, my young female had a good deal of white on the sides and under parts. The male *Mesoplodon* had a good many "corduroy" markings on the shoulders and belly ; the adult female had none of these, but I think it would be rash to say that this is a sexual difference, as the young female *had* traces of these markings.

The sternum of the male had six pairs of ribs attached to it. The sternum of the female had only five pairs, and was differently shaped from that of the male. I do not think, however, that this is a sexual difference, as another sternum of a male I examined more resembled that of the female sternum. Here, then, is another case of "individual variation."

One marked sexual difference is always to be seen in this species. The male has two large functional teeth in the lower jaw, from which they project about 2 inches above the gum. The female has only rudimentary ones, and these are hidden half an inch below the surface of the gum, while the half-grown female had 50 additional small dolphin-like teeth present in both jaws. That is to say, there are, in this young specimen, in addition to the two rudimentary tusk-like teeth in the lower jaw, 17 small ones behind them on each side, and 8 on each side of the upper jaw. I believe a *new genus* was once founded on the presence of similar rudimentary teeth in *Mesoplodon*.

It may be interesting to state that the dorsal fin of the male was placed nearly a foot farther back than that of the female. Is this another "individual variation" ?

I have come to the conclusion that the male stranded in 1896, and the mother and young stranded in 1899, were all members of one family. It was reported to me in 1896 that the stranded whale was accompanied by another, and also a young one, both of which got away. Now as this species is over 5 feet long when born, one would expect it to grow 4 or 4.5 feet more in three years, say 18 inches per annum. The

young female that came under my notice was over 9.5 feet long, while the mother was nearly 16 feet. There was no evidence that the mother had had another calf, as the mammæ were shrunk, and the uterus was empty. It is thus possible that this young female was born near Nairn in September 1896, and stranded near Nairn in September 1899. I may remark that all three had tails shaped like the one figured by Sir Wm. Turner ("Journ. Anat. Phys.," 1885). I think it unnecessary to give detailed measurements now.

If the larger whales are often mistaken, the one for the other, no wonder that Porpoises and Dolphins are often neglected along our coasts. *Globicephalus melas* and *Phocæna communis* are the only two species of Delphinidæ that are plentiful. *Tursiops tursio*, *Delphinus delphis*, and *Lagenorhynchus albirostris* are scarce, and may at times pass unnoticed.

LAGENORHYNCHUS ACUTUS (White-sided Dolphin).—Has been recorded from a skull. This is a very rare animal in Scotland, as I will show when I speak of another species which must have been mistaken for it at times.

I know of no specimens of *Orca* or *Grampus* having been stranded or captured in the Moray Firth.

DELPHINAPTERUS LEUCAS (White Whale).—Has been seen at long intervals. Some years ago, one was seen for several days off the coast of Banffshire. It was repeatedly shot at, but was not secured. One was caught at Little Ferry, Sutherland, in 1879.

No mention is made of *Prodelphinus* in Mr. Lydekker's book on British mammals, although it is not a very rare genus on the coasts of Britain. Skulls of *Prodelphinus* are often to be seen in the large museums of Scotland. The Hunterian Museum in Glasgow has at least two skulls, supposed to be from west of Scotland, belonging to individuals of this genus. I think there are two in the Anatomical Museum in Edinburgh. There is a complete skeleton in the museum of University College, Dundee, which was prepared from a local specimen. There is also another skull in the same museum. I have a rather badly preserved

skull of a species of this genus which *may* be from the Moray Firth. I believe that members of this genus have been often taken for *Lagenorhynchus acutus*, for the one animal is just as much a *white-sided* dolphin as the other. With the exception of a young skull in University College, Dundee, I know of no other skull of *L. acutus* in any Scotch museum.

SEALS.

It is surprising that many educated people in the north of Scotland say there are only two species of seals found on our coasts; yet five or six species have been recorded from the Scottish seas. Strange to say, Mr. Lydekker makes no mention of *Phoca barbata* in his book on British mammals. *Phoca granlandica* has been recorded from the coast of Aberdeenshire. I do not know of any record of *Phoca hispida* in or near the Moray Firth.

PHOCA VITULINA (Common Seal).—Is often caught in salmon-nets on both sides of the Moray Firth, and sometimes dead ones are washed ashore.

HALICHAERUS GRYPUS (Gray Seal).—Is also caught occasionally in salmon-nets. I have the skull of a male from Port-Gordon. A very large one was caught some years ago near Burghead, but probably it is more frequently found on the north side of the Moray Firth.

Even the rare *Cystophora cristata* may be looked for in the Moray Firth, as it has been recorded from Orkney within the past few years.

As seals are sometimes cast ashore in a putrid state with part of the hair wanting, the species cannot be identified except by an examination of the skull. As I have the skulls of three or four species always at hand, I should like to receive notice of any dead specimens seen along the shores of the Moray Firth, or have the skulls sent to me, whole or broken, for the purpose of identification; also of any Whale or Porpoise *over six feet long*, for these should always be seen and identified.

REPORT ON THE MOVEMENTS AND OCCURRENCE OF BIRDS IN SCOTLAND DURING 1899.

By T. G. LAIDLAW, M.B.O.U.

THE usual schedules for recording observations were supplied to the Light Stations which have furnished returns during the last few years, and reports have been sent in by twelve observers. Schedules and notes have also been received from twenty-three inland observers in different parts of the country, the total number of schedules returned being forty-two, a decrease of eleven compared with the returns for 1898.

While the falling off in the number of schedules returned is unfortunate, we regret also to notice that the information supplied, in some cases, is not so full as usual, and would impress on our correspondents the importance of having the *data* as full and complete as possible. The returns from Skerryvore and Dhuheartach are, however, a notable exception.

The need for additional observers may again be adverted to, several of the faunal areas being inadequately represented. It is much to be desired that those interested in the subject may be induced to send in their notes. Schedules may always be obtained from Mr. Eagle Clarke, Museum of Science and Art, Edinburgh.

To all those who have aided us in these inquiries, we again accord our hearty thanks.

The following list gives the names of the observers from whom schedules and notes have been received. The localities are arranged under the different faunal areas, proceeding from north to south, along the East and West Coasts.

SHETLAND.

<i>Locality.</i>	<i>Name of Observer.</i>
North Unst L.H.	John M'Lean, Lightkeeper
Dunrossness	Thomas Henderson, jun.

ORKNEY.

<i>Locality.</i>	<i>Name of Observer.</i>
North Ronaldshay L.H.	John A. Mackay, Lightkeeper.
Noup Head L.H.	Thomas J. Wallace, Lightkeeper.
Pentland Skerries L.H.	Robert A. M'Harrie, Lightkeeper.
Sule Skerry L.H.	James Tomason, Lightkeeper.

SUTHERLAND AND CAITHNESS.

Cape Wrath L.H.	Neil M'Donald, Lightkeeper.
Thurso	Lewis Dunbar.

MORAY.

Beaully	Lionel W. Hinxman, B.A.
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DEE.

Rattray Head L.H.	Robert Clyne, Lightkeeper.
Peterhead	Rev. William Serle, M.A.
Aberdeen District	L. G. Esson.

TAY.

Auchinblae, Fordoun	John Milne.
Ballinluig	Bruce Campbell.
Comrie	William Evans.
Tayfield	William Berry, B.A., LL.B.

FORTH.

Isle of May L.H.	T. E. Arthur, Lightkeeper.
Row, Doune	Lt.-Col. Duthie.
Lothians	William Evans.
Edinburgh District	Bruce Campbell.
Dalmeny Park	Charles Campbell.
Bo'ness	Robert Godfrey, M.A.
Musselburgh	Rev. William Serle, M.A.

TWEED.

Broughton	A. C. Gairns.
Halmyre	D. G. Laidlaw.
Chirnside	Charles Stuart, M.D.

OUTER HEBRIDES.

Island Ghlais L.H.	James M'Guffie, Lightkeeper.
North Bay, Barra	John MacRury, M.B.

ARGYLL AND INNER HEBRIDES.

<i>Locality.</i>	<i>Name of Observer.</i>
Scarnish, Tiree	Peter Anderson.
Skerryvore L.H.	J. Nicol and William Ross, Light-keepers.
Dhuheartach L.H.	William Begg, Lightkeeper.

CLYDE.

Lamlash L.H.	James Edgar, Lightkeeper.
Carmichael, Thankerton	Rev. J. D. W. Gibson, B.A.
Various Localities	M. Barr, John Craig, C. Berry, John Paterson, John Robertson, H. B. Watt, and R. Wilson.

SOLWAY.

Dumfries	Robert Service.
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GENERAL REMARKS.

The earlier months of 1899 were characterised by unusually mild weather, which continued, with the exception of a short spell of frost and snow early in February, till near the end of March, when a period of cold, rainy, unsettled weather, with a great deficiency of sunshine, set in. It was not until May had well-nigh run its course that genial spring weather was experienced.

The unfavourable conditions prevailing during the period of the spring migration affected the movements of birds materially, especially on the East Coast. In the returns received there is scarcely any evidence of a marked movement having taken place; indeed, at one or two of the stations it is stated that there was "no migration this spring."

On the West Coast, at Skerryvore and Dhuheartach, on March 12th, a rush took place. Thrushes, Blackbirds, Redwings, Larks, and Pipits were in great abundance all night, the wind being S.E., with haze. At the latter station, on April 2nd and 3rd, another extensive movement was noted. At Tiree, White Wagtails and Whimbrels were very numerous from May 3rd to 5th.

The first important movement in the autumn occurred on the East Coast on Aug. 30th and 31st. Many small birds were at the light at North Ronaldshay, Noup Head, and Ratray Head. On the night of Nov. 11th, at North Ronaldshay, Thrushes, Blackbirds, Woodcocks, and small birds were striking hard, 150 being killed.

The movement at the end of August and the beginning of September was much in evidence on the West Coast. At Island Ghlais, on Aug. 30th, many Wheatears and other small birds were killed; and at Skerryvore and Dhuheartach, from Aug. 29th to Sept. 3rd, rushes of Wheatears, Whinchats, Redstarts, Pipits, and Wagtails were noted. Wind light from S.E. At Dhuheartach and Lamlash, on Oct. 1st and 2nd, Larks, Pipits, etc., were passing. Thrushes, Redwings, Blackbirds, etc., were recorded at Skerryvore and Dhuheartach on Oct. 23rd to 25th; and other rushes of Turdidæ, Lapwings, etc., occurred on Nov. 17th to 19th and Dec. 6th.

The list of casual and rarer visitants includes Golden Oriole, at Menstrie, May 19th, and at Newton Stewart, end of April; Great Gray Shrike, Solway, Oct. 14th; Rose-coloured Starling, North Berwick, July 26th; Bee-eater, Symbister, Shetland, in June; King-Eider, Dunrossness, Feb. 24th, and St. Andrews Bay, June 6th; Pratincole, Montrose, Nov. 4th; Black Tern, Aberlady, Aug. 7th; and Great Shearwater, St. Kilda, in July.

The Pied Flycatcher was noted in unusual abundance on the East Coast during the second week of May.

TURDUS MUSICUS (Song Thrush).

Orkney—North Ronaldshay, Nov. 5th, all day; Nov. 11th, all night with other birds, 150 killed. Noup Head, Nov. 9th, numbers at lantern. Sule Skerry, Nov. 3rd-10th, numerous. *Sutherland*—Cape Wrath, Feb. 25th, all day, small flocks. *Forth*—Isle of May, Feb. 23rd, all night with Blackbirds and Larks; Nov. 22nd, many, a few killed. *Argyll and Isles*—Skerryvore, March 12th, with Larks and Blackbirds, several killed, "first rush this year"; April 28th, striking with Fieldfares and small birds; Oct. 7th, at light, with Fieldfares, Larks, and Pipits; Oct. 25th, rush of Turdidæ, striking hard all night; Nov. 14th, 24th, 26th, at light, several killed; Dec. 22nd, rush with Blackbirds. Dhuheartach, March 12th-13th, flying round light

with Larks, etc.; April 2nd-3rd, rush of birds—Redwing, Larks, Pipits, etc.; Oct. 24th-25th, all night, great numbers, Turdidæ, Larks, etc.; Nov. 17th-24th, with Blackbirds, Fieldfares, and Larks; Dec. 6th, great numbers. Tíree, Oct. 4th. *Clyde*—Lamlash, Oct. 2nd, many.

Principal movements, Nov. 9th-11th, E.; Oct. 25th, Nov. 14th-24th, West Coast.

• TURDUS ILIACUS (Redwing).

Orkney—Sule Skerry, Nov. 3rd-10th, numerous. *Dee*—Aberdeen, April 29th, three; Oct. 23rd. *Tay*—Auchinblae, Nov. 8th. *Forth*—Edinburgh, April 6th, last seen; Oct. 15th, 21st, and 22nd. *Tweed*—Halmyre, Oct. 25th. *Argyll and Isles*—Skerryvore, April 2nd and 3rd, with rush, striking hard; April 6th, with Fieldfares and Wheatears; Oct. 25th, rush of Turdidæ. Dhuheartach, April 2nd and 3rd, rush of birds—Thrushes, Larks, Pipits, etc.; Oct. 23rd and 24th, rush of Turdidæ, Larks, etc., great numbers. Tíree, Oct. 5th. *Clyde*—Beith, Oct. 15th; Thankerton, Oct. 17th.

Earliest, Tíree, Oct. 5th. Principal movements, April 2nd and 3rd, Oct. 23rd-25th.

TURDUS PILARIS (Fieldfare).

Shetland—North Unst, Oct. 7th, flock. *Orkney*—Noup Head, Dec. 6th, great numbers. Sule Skerry, Nov. 3rd-10th, numerous. *Sutherland*—Cape Wrath, May 15th-17th, large numbers. *Dee*—Ratray Head, May 1st, six large flocks; Dec. 6th, several flocks. Aberdeen, April 29th, last seen; Oct. 23rd, small flock. *Tay*—Auchinblae, May 20th. *Forth*—Isle of May, May 10th, large flock; Nov. 4th, large flock. Dreghorn, May 13th, flock of 180. *Tweed*—Halmyre, May 12th, large flock passing N.; Oct. 25th, two flocks. *Argyll and Isles*—Skerryvore, April 6th, with Redwings and Wheatears at light; April 28th, with Thrushes and small birds, striking; Oct. 7th, at light, with Thrushes, Pipits, and Larks; Oct. 25th, with rush of Turdidæ, striking hard all night. Dhuheartach, May 16th, one on rock; Oct. 24th-25th, rush,—Turdidæ, Larks, etc.,—great numbers; Nov. 17th, with other birds; Dec. 3rd and 6th, great numbers. Tíree, May 18th, small flock, “rare so late”; Nov. 14th, passing. *Clyde*—Thankerton, May 13th, still here. Beith, May 14th, flock; 21st, two. Lamlash L.H., Oct. 2nd, rush of birds. Carnwath, Oct. 23rd, good many.

Principal movements, Oct. 7th, 24th-25th.

TURDUS MERULA (Blackbird).

Orkney—North Ronaldshay, Nov. 11th, all night with Thrushes, Woodcocks, and other birds. Sule Skerry, Nov. 3rd-10th, numerous. *Forth*—Isle of May, Feb. 23rd, all night with Thrushes

and Larks. *Argyll and Isles*—Skerryvore, March 12th, a rush with other birds, several killed; April 2nd and 3rd, strong rush of birds, striking hard; Nov. 26th, at lantern; Dec. 22nd, rush with Thrushes, etc., several killed. *Dhuheartach*, Oct. 23rd-25th, rush, great numbers of *Turdidæ*; Nov. 7th, flocks, with many other birds; Dec. 6th, great numbers. *Tiree*, Oct. 30th.

TURDUS TORQUATUS (Ring Ousel).

Dee—Peterhead, April 19th, a ♂, "rare here." *Aberdeen*, Oct. 23rd, one shot, "rare here." *Tay*—Balnagard, Sept. 12th. *Forth*—Clubby Dean, March 30th, one. *Musselburgh*, April 26th, ♀. *Isle of May*, Nov. 22nd, one. *Clyde*—Greenock, April 3rd. *Lendalfoot*, April 4th.

Earliest observed, Clubby Dean, March 30th.

SAXICOLA CENANTHE (Wheatear).

Shetland—North Unst, May 1st, one. *Orkney*—North Ronaldshay, April 16th, many; Aug. 30th, all night at lantern, many killed. *Noup Head*, April 1st, two; July 31st, three on lantern. *Pentland Skerries*, May 6th, one. *Sutherland*—Cape Wrath, April 23rd, two; Aug. 4th, many young birds. *Dee*—Rattray Head, a ♂ at lantern; Sept. 4th, many with other birds. *Aberdeen*, April 3rd, six. *Forth*—*Isle of May*, April 2nd, about two dozen. *Comiston*, April 4th, 21 in field. *Dalmeny*, Oct. 7th. *Tweed*—*Halmyre*, April 6th. *Chirnside*, March 30th, Sept. 1st. *Outer Hebrides*—*Island Ghlais L.H.*, April 5th, two; Aug. 30th, many at light. *Argyll and Isles*—*Skerryvore*, March 27th, first; April 2nd-3rd, rush; 6th and 7th, with Redwings and Fieldfares (leg and wings sent); 14th-15th, many at lantern; May 10th and 15th, killed at lantern; Aug. 29th-30th, with rush of small birds—Whinchats, Redstarts, etc.; Sept. 2nd-3rd, many striking; 13th, at light. *Dhuheartach*, April 8th, midnight, at lantern; 23rd and 30th, at light; May 10th, killed at light; 13th-15th, several flying about; Sept. 2nd and 3rd, at light with Pipits and Wagtails; 12th-13th, several; Oct. 10th, two killed. *Tiree*, April 7th, several. *Clyde*—*Lamlash L.H.*, April 15th, two; 16th, numerous. *Lendalfoot*, March 18th. *Solway*—*Dumfries*, March 24th, one.

Earliest, March 18th, *Lendalfoot*; latest, Oct. 10th, *Dhuheartach*. Principal movements, April 2nd-3rd, Aug. 30th, Sept. 2nd-3rd.

PRATINCOLA RUBETRA (Whinchat).

Orkney—*Noup Head*, April 14th, one. *Dee*—*Aberdeen*, May 11th, two. *Tay*—*Fordoun*, May 7th. *Ballinluig*, Sept. 17th. *Forth*—*Comiston*, May 4th. *Isle of May*, May 11th (leg and wing sent). *Tweed*—*Broughton*, May 2nd. *Chirnside*, April 11th,

Aug. 14th. *Argyll and Isles*—Skerryvore, Aug. 29th-30th, rush of small birds; Sept. 2nd-3rd, all day. Dhuheartach, May 10th, several; 13th and 14th, several on rock; Sept. 17th, one rested on lantern. *Clyde*—Beith, April 30th. Lendalfoot, May 1st.

Earliest, April 11th, Chirnside.

RUTICILLA PHENICURUS (Redstart).

Dee—Aberdeen, May 5th, one. Rattray Head, May 10th, ♂. *Tay*—Comrie, April 28th, ♂. *Forth*—Longniddry, May 1st. Isle of May, May 11th (leg and wing sent). *Tweed*—Broughton, Halmyre and Chirnside, May 4th. *Argyll and Isles*—Skerryvore, Aug. 29th, in rush of birds; Sept. 5th and 6th, at lantern with other small birds. Dhuheartach, May 17th, ♂ and ♀ on rock; Oct. 11th, ♀ killed. *Clyde*—Giffnock, April 23rd. Thankerton, April 29th. Beith, Sept. 2nd.

Earliest, April 23rd, Giffnock; latest, Oct. 11th, Dhuheartach.

SYLVIA CINEREA (Whitethroat).

Tay—Fordoun, May 6th. Glenfarg, Sept. 21st. *Forth*—Braids and Comiston, May 8th. Isle of May, May 11th (wings received). *Tweed*—Halmyre, May 5th. *Clyde*—Lamlash L.H., May 10th, killed at lantern (leg and wing received). Beith and Thornliebank, May 7th. Thankerton, May 7th, one. *Solway*—Dumfries, May 13th, large numbers.

Earliest, May 5th, Halmyre; latest, Sept. 21st, Glenfarg.

SYLVIA ATRICAPILLA (Blackcap).

Forth—Kirknewton, April 22nd, ♂. *Tweed*—Chirnside, May 12th, Aug. 1st. *Argyll and Isles*—Skerryvore, Sept. 7th, "rare occurrence." *Clyde*—Thornliebank, May 7th.

Earliest, April 22nd, Kirknewton.

SYLVIA HORTENSIS (Garden Warbler).

Tweed—Chirnside, May 9th, Sept. 10th. *Clyde*—Thornliebank, May 7th. Beith, May 11th.

REGULUS CRISTATUS (Gold-crested Wren).

Orkney—North Ronaldshay, April 16th, many, also Robins and Wheatears. *Dee*—Peterhead, April 15th-22nd, many captured on bent, exhausted. *Outer Hebrides*—Island Ghlais L.H., March 16th, at light with other small birds. *Clyde*—Lamlash L.H., April 13th, at lantern till daylight; Sept. 2nd and Oct. 5th, at light.

PHYLLOSCOPUS RUFUS (Chiffchaff).

Tweed—Chirnside, April 5th, Oct. 1st. *Clyde*—Lendalfoot, April 6th. *Outer Hebrides*—Barra, Nov. 18th, two.

PHYLLOSCOPUS TROCHILUS (Willow Wren).

Tay—Comrie, April 25th (singing). Methven Boy, Sept. 23rd. *Forth*—Hermitage, Blackford Hill, April 21st. Isle of May, May 11th (wings and legs sent). *Tweed*—Halmyre, April 22nd, several; Sept. 14th, last seen. Broughton, April 23rd. *Outer Hebrides*—Barra, March 15th, one in garden. *Clyde*—Beith, April 8th. Lendalfoot, April 17th. Lamblash L.H., Aug. 25th, two. Pollokshaws and Queen's Park, Glasgow, Sept. 12th. *Solway*—Dumfries, April 16th, one.

Earliest, March 15th, Barra; latest, Sept. 23rd, Methven Boy.

PHYLLOSCOPUS SIBILATRIX (Wood Wren).

Forth—Braid Hermitage, May 5th, one singing. *Tweed*—Chirnside, May 20th, Sept. 1st. *Clyde*—Beith, May 14th.

Earliest, May 5th, Braid.

ACROCEPHALUS PHRAGMITIS (Sedge Warbler).

Tay—Fordoun, May 9th. *Forth*—Comiston, May 10th. Braid Burn, May 10th. Isle of May, May 15th (leg and wing). *Tweed*—Halmyre, May 5th. Chirnside, May 1st, not plentiful. *Clyde*—Thornliebank, April 30th.

Earliest, April 30th, Thornliebank.

LOCUSTELLA NÆVIA (Grasshopper Warbler).

Clyde, Beith, April 30th.

MOTACILLINÆ (Wagtails).

Shetland—North Unst, Wagtails, April 23rd, one. *Orkney*—North Ronaldshay, Wagtails, Sept. 7th, nine, seldom seen. Pentland Skerries, Wagtails, May 5th, several. *Sutherland*—Cape Wrath, Wagtails, April 21st, one; May 2nd, three; May 15th, two; Sept. 1st, one. *Moray*—*M. raii* (Yellow Wagtail), July 11th, one in meadows at mouth of Beaully River ("Annals," 1900, p. 48). *Dee*—Rattray Head, *M. melanope* (Gray Wagtail), Aug. 30th, at lantern with other birds. *Forth*—Musselburgh, *M. lugubris* (Pied Wagtail), Sept. 12th, in some numbers. *Tweed*—Chirnside, *M. alba* (White Wagtail), May 15th, Tweed. *M. raii*, May 15th, Whiteadder. *Outer Hebrides*—Island Ghlais, Wagtails, April 7th, several. *Argyll and Isles*—Tiree, Wagtail, March 2nd. *M. alba*, May 3rd, a few; May 5th, many;

Aug. 18th, returning south. Skerryvore, Aug. 18th, on rock. Dhuheartach, April 30th, one; May 11th, seven on rock, Wagtails; Sept. 2nd, with Wheatears, Pipits, etc.; Sept. 12th, several at lantern; Nov. 4th, flocks passing. *M. melanope*, Oct. 22nd, one. *Clyde*—Lamlash L.H., March 19th, first, Wagtails; April 8th, numerous all day. Dalbeth, *M. alba*, April 23rd. Beith, *M. raii*, April 21st. Carmyle, April 22nd. Aug. 10th, on Clyde between Farme and Dalbeth, 200 to 250, mostly immature. Beith, Sept. 16th. Lamlash L.H., Wagtails, Sept. 22nd-30th, passing. Queen's Park, Glasgow, *M. lugubris*, Oct. 16th, last noted.

ANTHUS PRATENSIS (Meadow Pipit).

Sutherland—Cape Wrath, Aug. 4th, many all day. *Outer Hebrides*—Island Ghlais L.H., March 16th, at light (6 killed) with Snow Buntings and Goldcrests. *Argyll and Isles*—Skerryvore, March 12th, rush with Thrushes and Blackbirds; April 2nd and 3rd, with rush of birds, many striking; April 14th and 15th, at lantern; May 10th-15th, several killed; Sept. 5th-6th, at lantern with other small birds; Oct. 7th, at light with Larks, Fieldfares, and Thrushes. Dhuheartach, April 2nd-3rd, round light with Larks, Thrushes, etc.; Sept. 2nd, at light with Wheatears, Wagtails, etc.; Oct. 1st, all night, Larks, etc.; Oct. 8th, three killed.

Principal movements, April 2nd-3rd, Sept. 2nd-6th, Oct. 1st-7th.

ANTHUS TRIVIALIS (Tree Pipit).

Tay—Comrie, April 25th. *Forth*—Malleny and Balerno, April 29th. Dalmeny, April 30th. *Tweed*—Halmyre, April 24th, several. *Clyde*—Braidwood, Cathcart, and Beith, April 23rd.

Earliest, April 23rd, *Clyde*.

ORIOULUS GALBULA (Golden Oriole).

Forth—Menstrie, May 19th, one picked up. *Solway*—Newton-Stewart, April, end of, one shot ("Annals," 1899, p. 182).

LANIUS EXCUBITOR (Great Gray Shrike).

Solway—Oct. 14th, one captured near Glencaple ("Annals," 1900, p. 48).

MUSCICAPA GRISOLA (Spotted Flycatcher).

Dee—Ratray Head L.H., May 14th, one picked up. *Forth*—Dalmeny, May 4th. Isle of May, May 11th (leg and wing sent). *Tweed*—Halmyre, May 15th. Chirnside, Sept. 10th, last. *Clyde*—Lendalfoot, April 12th. Beith, April 13th. Queen's Park, Sept. 22nd.

Earliest, April 12th, Lendalfoot.

MUSCICAPA ATRICAPILLA (Pied Flycatcher).

Dee—Peterhead, early summer, two procured, others seen. *Tay*—Fordoun, May 21st. *Forth*—Dunbar, May 10th; May, second week of, unusually numerous about Dunbar ("Annals," 1899, p. 181). Isle of May, May 11th (leg and wing sent). *Tweed*—Chirnside, May 15th. Whitecross, Coldingham, St. Abb's, and other places. *Solway*—Dumfries, May 21st, one.

HIRUNDO RUSTICA (Swallow).

Shetland—North Unst, May 18th, one. *Orkney*—North Ronaldshay, May 7th, two. Noup Head, May 22nd, numbers. Pentland Skerries, May 16th, several, tired out. *Sutherland*—Cape Wrath, May 14th, one. *Dee*—Ratray Head, May 7th, several. *Tay*—Fordoun, March 28th. Tayfield, April 20th. *Forth*—Buckstone Farm, April 20th, one. Gogar House and Dalmeny, April 21st. Musselburgh, Oct. 10th. *Tweed*—Broughton, March 31st. Halmyre, April 16th, a pair; Oct. 16th, two flocks. Innerleithen, Oct. 16th. *Outer Hebrides*—Island Ghlais L.H., April 7th, one. *Argyll and Isles*—Dhuheartach, May 25th, flying round tower. Skerryvore, Aug. 18th, flying about rock. *Clyde*—Cambuslang, April 17th. Lamlash L.H., May 8th, numerous. Thornliebank, Oct. 7th. *Solway*—Dumfries, April 14th, a few; April 26th, large flocks.

Earliest, March 28th, Fordoun; latest, Oct. 16th, Halmyre and Innerleithen.

CHELIDON URBICA (House Martin).

Orkney—North Ronaldshay, May 22nd (skin sent). *Forth*—Aberlady, April 19th. Musselburgh, April 22nd, Oct. 4th. *Tweed*—Chirnside, May 1st, not numerous; Oct. 1st. Halmyre, May 5th, plentiful; Oct. 12th, a small flock. *Argyll and Isles*—Dhuheartach, June 1st, flying about rock. *Clyde*—Thornliebank, April 23rd. Lendalfoot, April 24th. Thankerton, Sept. 28th, many, last of season.

Earliest, April 19th, Aberlady; latest, Oct. 12th, Halmyre.

COTILE RIPARIA (Sand Martin).

Dee—Aberdeen, Sept. 25th, last. *Tay*—Fordoun, May 3rd. *Forth*—Dalmeny, April 3rd. Loch Leven, April 7th. *Tweed*—Chirnside, April 4th, Sept. 1st. Halmyre, April 7th. *Clyde*—Dalbeth, April 9th. Lamlash L.H., May 7th, one; 8th, many.

Earliest, April 3rd, Dalmeny; latest, Sept. 25th, Aberdeen.

FRINGILLA MONTIFRINGILLA (Brambling).

Tay—Fordoun, May 5th, last seen. *Forth*—Fairmilehead, March 8th. Morton, Oct. 25th, one. Easter Bush, Nov. 15th, several. *Tweed*—Halmyre, Oct. 10th, several. Chirnside, Oct. 10th, flock of 30. *Clyde*—Thankerton, April 17th, still here; Oct. 17th, have arrived.

LINOTA FLAVIROSTRIS (Twite).

Tay—Fordoun, Feb. 1st, about 200. *Forth*—Comiston, Nov. 2nd, flock of 40. *Tweed*—Halmyre, Nov. 3rd, flock.

PLECTROPHANES NIVALIS (Snow Bunting).

Shetland—North Unst, Sept. 17th, large flock. *Orkney*—North Ronaldshay, Oct. 23rd, about 300. Noup Head, Jan. 30th, twenty at lantern; Nov. 25th, all day, numerous. *Sutherland*—Cape Wrath, March 14th, last flock seen; April 2nd, one killed at lantern. *Dee*—Aberdeen, Sept. 23rd, great numbers. *Tay*—Fordoun, Nov. 13th, small flock. *Forth*—Edinburgh, Nov. 9th, small flock top of Arthur's Seat. *Outer Hebrides*—Island Ghlais, March 16th, at light with Pipits and Goldcrests; March 30th, at light. *Argyll and Isles*—Dhuheartach, Sept. 17th, one rested; Oct. 7th, captured at light.

STURNUS VULGARIS (Starling).

Orkney—Noup Head, Sept. 4th, all day; Oct. 20th, at light, numbers; Dec. 16th, great numbers. *Sutherland*—Cape Wrath, March 16th, ten at lantern. *Argyll and Isles*—Skerryvore, March 2nd, at lantern; April 2nd, in rush, many striking; Nov. 16th and 18th, several on rock. Dhuheartach, Oct. 16th, one flew into kitchen. *Clyde*—From mid-February till first week in March, great movement over south Glasgow, east to west. Lamlash L.H., March 10th and 19th, at lantern.

PASTOR ROSEUS (Rose-coloured Starling).

Forth—North Berwick, July 26th, one seen ("Annals," 1899, p. 238).

ALAUDA ARVENSIS (Skylark).

Orkney—Noup Head, March 8th and 9th, at lantern. Pentland Skerries, March 7th, several. *Sutherland*—Cape Wrath, Feb. 22nd, a few. *Forth*—Isle of May, Feb. 23rd, all night with Thrushes and Blackbirds; Nov. 5th, flock. *Outer Hebrides*—Island Ghlais, March 24th, at light; March 30th, flying round light with Snow Buntings, etc. *Argyll and Isles*—Skerryvore, March 13th, a rush, with other

birds; April 2nd, in rush, several killed; April 14th and 15th, at lantern; Oct. 7th, at light, with Pipits, Thrushes, and Fieldfares. Dhuheartach, March 13th, flying round light with Thrushes and Lapwings; April 2nd and 3rd, at light with Thrushes, Redwings, and Pipits; Sept. 21st, passing; Oct. 1st, all night; Oct. 8th, flocks passing all day; Oct. 23rd and 24th, rush of birds. *Clyde*—Thankerton, Sept. 14th, great migratory flight.

Principal movements, March 7th-9th and 13th, April 2nd-3rd, Oct. 7th-8th, 23rd and 24th.

CYPSELUS APUS (Swift).

Dee—Aberdeen, May 15th, two; Sept. 2nd, two. Rattray Head, August 30th, caught on tower, other birds at lantern. *Tay*—Fordoun, May 10th. *Forth*—Morningside, May 4th, one. Linlithgow, May 6th. Musselburgh, May 13th, Aug. 10th. *Tweed*—Halmyre, May 10th, passing. Chirnside, May 10th, Aug. 31. *Argyll and Isles*—Skerryvore, May 6th, resting in window; July 18th, one caught on tower. Dhuheartach, April 28th, one flying about rock; July 18th, three; Aug. 6th, two. *Clyde*—Crookstone and Kilbirnie Loch, May 3rd. *Solway*—Dumfries, May 18th.

Earliest, April 28th, Dhuheartach; latest, Sept. 2nd, Aberdeen.

CAPRIMULGUS EUROPÆUS (Nightjar).

Orkney—Deerness, May 19th. *Dee*—Aberdeen, May 24th. *Clyde*—Lamlash, April 23rd. Pollokshaws, May 21st.

DENDROCOPUS MAJOR (Great Spotted Woodpecker).

West Ross—Braemore, March 9th ("Annals," 1899, p. 110). *Forth*—Dalmeny Park, pair remained till first week in May. Dalkeith Park, March 16th, two. *Tweed*—Chirnside, several in district. Two nests at Duns Castle, from which the young got off. *Argyll and Isles*—Skerryvore, Oct. 28th, one caught on rock.

CUCULUS CANORUS (Cuckoo).

Sutherland—Cape Wrath, May 19th, one. *Dee*—Aberdeen, May 11th. *Tay*—Comrie, April 29th. *Forth*—Dalmeny, May 5th. Isle of May, May 15th. *Tweed*—Halmyre, April 23rd; Aug. 18th, adult. Broughton, April 26th. Chirnside, April 28th. *Argyll and Isles*—Skerryvore, April 26th. Dhuheartach, April 26th. Tiree, May 8th. *Clyde*—Milngavie, April 8th. Lendalfoot and Beith, April 26th. Lamlash L.H., May 1st. Thankerton, May 1st. *Solway*—Dumfries, April 12th.

Earliest, April 8th, Milngavie.

MEROPS APIASTER (Bee-eater).

Shetland—Symbister, June 1899, seen for some days and then picked up dead ("Annals," 1900, pp. 48-49).

STRIGIDÆ (Owls).

Sutherland and Caithness—Thurso, *Asio accipitrinus* (Short-eared Owl), Aug. 10th, ♀ shot. *Argyll and Isles*—Skerryvore, *A. accipitrinus*, Aug. 13th, on rock. *Orkney*—North Ronaldshay, *Nyctea scandiaca* (Snowy Owl), Feb. 1st, one; Nov. 9th, one.

FALCONIDÆ (Falcons and Hawks).

Sutherland and Caithness—*Archibuteo lagopus* (Rough-legged Buzzard), March 22nd, ♂ trapped at Braemore. *Forth*—*Buteo vulgaris* (Common Buzzard), Oct. 16th, two in keeper's larder at Kilmahog.

ANSERINÆ (Geese).

Shetland—Dunrossness, *A. albifrons* (White-fronted Goose), Dec. 13th, shot on Loch Spiggie ("Annals," 1900, p. 50). *Moray*—*Bernicla leucopsis* (Bernacle Goose), Nov. 9th, shot near Tain ("Annals," 1900, p. 49). *Dee*—*B. brenta* (Brent Goose), Oct. 14th, shot near Aberdeen. *Tay*—Tayfield, *A. brachyrhynchus* (Pink-footed Goose), April 28th, last seen; *A. albifrons*, April 19th, one of three shot ("Annals," 1899, p. 182). *Forth*—*A. brachyrhynchus*, April 18th, a small flock, Aberlady Bay; Oct. 4th, a flock, Aberlady. *Argyll and Isles*—Tiree, *A. albifrons*, May 4th, left; Oct. 12th, returned. *Clyde*—Thankerton, *A. brachyrhynchus*, Nov. 25th, two shot, very numerous this winter.

CYGNINÆ (Swans).

Caithness—Thurso, *C. musicus* (Whooper), March 22nd, 24 passing N.E. Watten, Oct. 25th, one shot. *Argyll and Isles*—Tiree, *C. musicus*, Nov. 3rd; *C. bewicki* (Bewick's Swan), March 12th, two flocks of 22 and 18 came in from E.; March 25th, still here; Nov. 13th, arrived.

ANATIDÆ (Ducks).

Shetland—Sandness, *Somateria spectabilis* (King Eider), Feb. 24th, ♂ shot ("Annals," 1899, p. 111). *Dunrossness*, *Mergus albellus* (Smew), Dec. 15th, shot on Loch Spiggie ("Annals," 1900, p. 50). *Sutherland and Caithness*—*Fuligula marila* (Scaup), nested this year in Sutherland ("Annals," 1899, pp. 215-216). *Caithness*, *Clangula glaucion* (Golden Eye), April 11th, adult ♂ on Loch Eye; *Spatula clypeata* (Shoveller), Aug. 19th, ♀ juv., Sandside, "rare." *Dee*—Aberdeen, *Anas streperus* (Gadwall), Sept. 23rd, ♂ shot. *Rattray Head*, *Fuligula ferina* (Pochard), April 29th, have left;

Harelda glacialis (Long-tailed Duck), April 29th, none after this; Oct. 14th, eight, first; *C. glaucion*, Nov. 19th, six; *Æ. nigra*, April 29th, none after this. *Tay*—Fordoun, *Mareca penelope* (Wigeon), Aug. 28th, at Auchinblae Dam. St. Andrews Bay, *S. spectabilis*, June 6th, an adult ♂ shot ("Annals," 1899, p. 239). *Argyll and Isles*—Tiree, *A. streperus*, April 27th, numbers, "very late"; *S. clypeata*, March 31st, ♂ and ♀. Dhuheartach, *S. mollissima*, Sept. 21st, first; Skerryvore, Sept. 21st, a flock, first. *Clyde*—*S. clypeata*, April 3rd, two pairs, Lochend Loch; *Dafila acuta* (Pintail), Dec. 14th, one shot in Clyde above Greenock. *Solway*—Long-tailed Duck, ♀ got in the autumn ("Annals," 1900, pp. 49-50).

TURTUR COMMUNIS (Turtle Dove).

Caithness—June 23rd, ♂, Berriedale. *Argyll and Isles*—Dhuheartach, Sept. 7th, one all day on rock.

CACCABIS RUFA (Red-legged Partridge).

Tay—Nov. 6th, ♂ shot in Forfarshire; a nest with eggs seen in the spring ("Annals," 1900, p. 50).

COTURNIX COMMUNIS (Quail).

Argyll and Isles—Skerryvore, Oct. 24th, one caught on rock, "rare."

CREX PRATENSIS (Land Rail).

Orkney—North Ronaldshay, May 16th, one. Noup Head, May 20th, one. Pentland Skerries, May 16th, one. *Caithness*—Stempster, Oct. 3rd. *Dee*—Aberdeen, May 5th, two. *Tay*—Fordoun, May 1st. *Forth*—Liberton, May 2. Comiston and Dalmeny, May 5th. *Tweed*—Halmyre, April 26th, two; Sept. 19th, last seen. Broughton, May 7th. Chirnside, May 1st. *Argyll and Isles*—Tiree, April 28th. Skerryvore, April 29th; June 7th, one on rock. Dhuheartach, May 23rd, one on rock. *Clyde*—Thornliebank, April 22nd. Arran, April 23rd. *Solway*—Dumfries, May 3rd, generally. Earliest, April 22nd, Thornliebank.

PORZANA MARUETTA (Spotted Crake).

Moray—Sept. 30th, shot near Culloden ("Annals," 1900, p. 51).

RALLUS AQUATICUS (Water Rail).

Caithness—Barrogill, Feb. 27th. *Clyde*—Thornliebank, April 19th, one.

GLAREOLA PRATINCOLA (Pratincole).

Tay—Nov. 4th, a bird of the year shot near Montrose ("Annals," 1900, p. 51).

EUDROMIAS MORINELLUS (Dotterel).

Forth—May 5th; two shot at Gullane.

CHARADRIUS PLUVIALIS (Golden Plover).

Argyll and Isles—Dhuheartach, May 10th, several at lantern, two killed; July 18th-19th, in numbers at light with many small birds, haze and rain. Tìree, March 31st, very large flocks; Oct. 22nd, flocks.

VANELLUS VULGARIS (Lapwing).

Orkney—Pentland Skerries, March 25th; April 10th, ten. *Argyll and Isles*—Dhuheartach, March 13th, flocks round light with Thrushes and Larks, haze.

STREPSILAS INTERPRES (Turnstone).

Dee—Rattray Head, Sept. 4th, small flock. *Forth*—Aberlady, Aug. 17th, two in summer plumage. *Argyll and Isles*—Tìree, Sept. 7th, have returned. Dhuheartach, Nov. 29th, a flock of twenty. *Clyde*—Bute, May 18th, numerous at St. Ninian's Bay and Ardscalpsie, fourteen in summer plumage. Barassie (Ayrshire), May 21st, six. Whiting Bay, Sept. 5th, about twenty. Bute, Sept. 7th, numerous small parties.

PHALAROPUS FULICARIUS (Gray Phalarope).

Dee—Aberdeen, Sept. 16th, "twelve, first time I have seen them here." *Argyll and Isles*—Dhuheartach, Sept. 27th, two.

SCOLOPAX RUSTICULA (Woodcock).

Orkney—North Ronaldshay, Nov. 1st, killed at lantern; Nov. 11th, at lantern with other birds. *Caithness*—Thurso, March 25th. *Forth*—Isle of May, Nov. 22nd, three or four. *Argyll and Isles*—Dhuheartach, Nov. 16th, one. *Clyde*—Lamlash L.H., April 13th, three.

GALLINAGO MAJOR (Great Snipe).

Solway—Young bird killed near Castle-Douglas ("Field," Oct. 21st, 1899, p. 667).

GALLINAGO GALLINULA (Jack Snipe).

Dee—Aberdeen, Sept. 16th, one. *Argyll and Isles*—Tìree, Oct. 8th.

TRINGA MINUTA (Little Stint).

Dee—Aberdeen, April 20th; Sept. 16th, three (leg and wing sent).

TRINGA SUBARQUATA (Curlew Sandpiper).

Dee—Aberdeen, Aug. 16th (wing sent).

TRINGA CANUTUS (Knot).

Dee—Aberdeen, April 29th, five. Rattray Head, Sept. 4th, flock. *Forth*—Aberlady Bay, July 23rd, five, three red.

MACHETES PUGNAX (Ruff).

Orkney—Harray, Sept. 21st, ♂. *Caithness*—Latheron, Sept. 11th, young ♀; Sept. 13th, ♂. *Forth*—Aberlady, Aug. 26th, four.

CALIDRIS ARENARIA (Sanderling).

Dee—Aberdeen, May 20th, ten. Rattray Head, Nov. 19th, one. *Forth*—Aberlady, Aug. 7th, five; Aug. 26th, several. *Argyll and Isles*—Dhuheartach, May 8th, one. Tiree, Sept. 1st, returned. *Clyde*—Barassie, May 21st-22nd, 25th.

TOTANUS HYPOLEUCUS (Common Sandpiper).

Tay—Fordoun, May 2nd. *Forth*—Loch Lubnaig, April 16th. Gencorse Burn, April 21st. Almond, April 21st. Isle of May, May 10th, one killed. *Tweed*—Halmyre, April 22nd, several. Broughton, April 23rd. *Argyll and Isles*—Tiree, May 16th. *Clyde*—Dalbeth, Thornliebank, and Beith, April 16th. Lendalfoot, May 17th. Lam-lash L.H., April 19th, a pair; April 20th, numerous. Thankerton, April 24th, two. Beith, Sept. 8th.

Earliest, April 16th, Loch Lubnaig, Dalbeth, etc.

TOTANUS FUSCUS (Spotted Redshank).

Clyde—Balgray Dam, Sept. 16th-17th, two birds ("Annals," 1900, pp. 51-52). *Solway*—Feb. 13th, ♀ shot at Kirkbean Row ("Annals," 1899, p. 112).

TOTANUS CANESCENS (Greenshank).

Forth—Aberlady, Aug. 26th, one. *Argyll and Isles*—Tiree, July 13th, two, young birds; Aug. 15th and 17th, several. *Clyde*—Balgray Dam, 16th, two; one remained till Oct. 14th.

LIMOSA LAPPONICA (Bar-tailed Godwit).

Forth—Musselburgh, April 4th, a flock of twenty. Aberlady Bay, July 8th, forty, two red. *Argyll and Isles*—Tiree, Oct. 28th, flock. *Clyde*—Bute, May 18th, two; Sept. 8th, one.

LIMOSA BELGICA (Black-tailed Godwit).

Argyll and Isles—Tiree, May 17th, a pair at Favie remained for ten days. *Clyde*—Balgray Dam, Sept. 21st, one; also one shot at Caldwell this month.

NUMENIUS PHÆOPUS (Whimbrel).

Orkney—North Ronaldshay, May 13th, many. *Dee*—Aberdeen, Oct. 14th, ten. *Forth*—Bo'ness, July 31st, one. Dunipace, Aug. 6th, five, flying W. Aberlady, Aug. 7th, many. Musselburgh, Aug. 30th-31st, strong migration during these nights, with other birds. *Argyll and Isles*—Tiree, April 30th, have arrived; May 4th, very numerous; May 5th, in shoals. Dhuheartach, May 23rd, one, on rock. *Clyde*—Lendalfoot, April 24th. Mearns Moor, May 20th, one. Bute, Sept. 8th, one.

STERNINÆ (Terns).

Caithness—Thurso, May 29th, *S. macrura* (Arctic Tern), numerous. *Dee*—Ratray Head, *S. minuta* (Lesser Tern), April 28th, two. *Forth*—Dalmeny, *S. fluviatilis* (Common Tern), Oct. 7th, many in Forth; Oct. 14th, a few. *S. minuta*, Aug. 8th, three at Musselburgh. Aberlady, *Hydrochelidon nigra* (Black Tern), Aug. 7th, one adult ("Annals," 1900, p. 52). *Argyll and Isles*—Dhuheartach, *C. macrura*, May 20th, several. Tiree, May 7th, several *S. fluviatilis*; May 7th, several *S. minuta*.

There are numerous other records of "Terns" which are unquotable, as the species are not specified.

LARINÆ (Gulls).

Shetland—North Unst, *L. leucopterus* (Iceland Gull), Sept. 26th, two. *Orkney*—Sule Skerry L.H., Nov. 23rd, one. *Argyll and Isles*—Dhuheartach, Nov. 29th, one. *Dee*—Aberdeen, *L. glaucus* (Glaucous Gull), April 2nd, three killed.

STERCORARIUS CATARRHACTES (Great Skua).

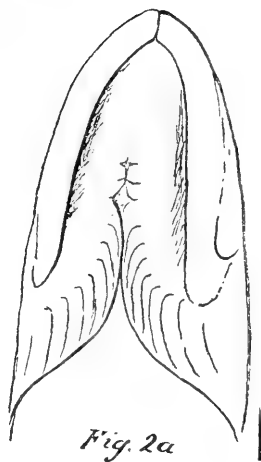
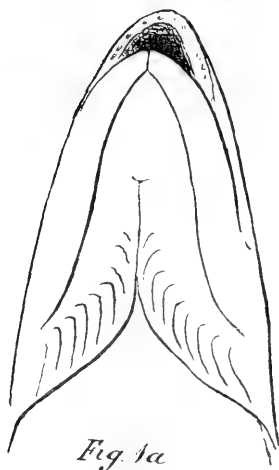
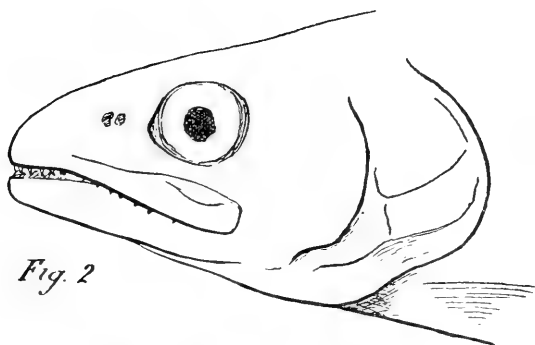
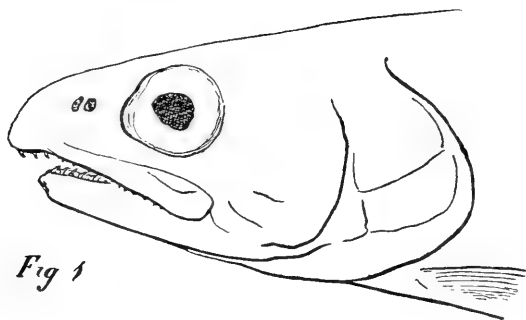
Argyll and Isles—Dhuheartach, July 28th-29th, two, first time observed here.

STERCORARIUS CREPIDATUS (Arctic Skua).

Caithness—Thurso, Aug. 12th. *Forth*—Oct. 14th, a good many near Inchkeith. *Argyll and Isles*—Tiree, June 3rd, arrived.

MERGULUS ALLE (Little Auk).

Shetland—North Unst, May 8th, one picked up. *Forth*—Portobello, Nov. 20th, one found in quarry. *Outer Hebrides*—Barra, April, one brought in by cat ("Annals," 1899, p. 183).



FULMARUS GLACIALIS (Fulmar).

Shetland—North Unst, nesting numerous in the high cliffs.

PUFFINUS MAJOR (Great Shearwater).

Outer Hebrides—June 11th, two seen near Barra ; July, last week, two birds killed at St. Kilda ("Annals," 1899, p. 239).

PUFFINUS ANGLORUM (Manx Shearwater).

Forth—June 15th, two seen between North Berwick and Elie. *Argyll and Isles*—Dhuheartach, March 22nd, all day in great numbers ; May 8th, great numbers.

OCEANODROMA LEUCORRHOA (Forked-tailed Petrel).

Caithness—Scotscladder, Nov. 14th. *Clyde*—Beith, Sept. 20th.

ICHTHYOLOGICAL NOTES.

By Dr. R. H. TRAQUAIR, F.R.S.

PLATE I.

I. DEFORMED TROUT FROM A POND AT DUNIPACE.

A LITTLE more than two years ago I received from Mr. Harvie-Brown a consignment of seven Trout (*Salmo fario*, L.) from the "Duck Pond" in his grounds at Dunipace. These Trout formed part of a lot which Mr. Harvie-Brown obtained from the breeding-ponds at Howieton as two-year-olds in 1895 ; and the specimens which were caught and sent to me in the autumn of 1897 averaged about half a pound in weight, and measure, as they now lie before me, from eleven to thirteen inches in length. That several of them at least presented abnormalities in the conformation of the jaws was at once observed by Mr. Harvie-Brown, at whose desire I have made the following short report on them, illustrated by the figures on Plate I.

In the appearance of four of these specimens there is nothing very striking ; in the fourth the anterior extremity of the mandible seems to extend perceptibly farther forward than is the case in the ordinary Trout. In the fifth and

sixth examples the mandible is abnormally short, so that the premaxillary part of the upper jaw projects beyond it in a striking manner, as represented in Figs. 1 and 1a on Plate I. It is not uncommon to find Trout, and other fishes too, with the snout imperfectly developed, so that the lower jaw projects conspicuously in front of the upper, but this is the first time that a case of the contrary condition has come under my notice. The head of the seventh specimen is represented in Figs. 2 and 2a of the same Plate. In the profile view shown in Fig. 2, it is at once seen that the mandible is, on the other hand, perceptibly abnormal in its length; but still more remarkable is its want of lateral symmetry, when the head is seen from below, as in Fig. 2a. Here it will be observed that the left ramus of the lower jaw is nearly straight, being hardly curved at all towards its extremity, while that of the right side shows an easy, well-marked curve along the whole of its length.

Mr. Harvie-Brown informs me that these Trout, of which the above-mentioned seven were samples, were unfit to eat, and that he is not aware that any are now alive in the pond.

It is difficult to assign any cause to these abnormal conditions in the jaws of the fish in question. Certainly it is not to be found in the nature of the food; for the stomachs of the seven above-noted specimens, having been carefully examined by Mr. Grimshaw, were found to contain nothing but ordinary fresh-water insects and larvæ, and in some cases shells of *Limnæa peregra*.

II. LONG-SPINED SEA-BULLHEAD CHOKED BY A VIVIPAROUS BLENNY.

This specimen of Sea-Bullhead (*Cottus bubalis*) was found dead on the shore at Fraserburgh by Mr. Norrie, and sent to the Museum of Science and Art by Mr. Harvie-Brown. It is six inches in length, and at once strikes the attention by having the tail of a Viviparous Blenny (*Zoarces viviparus*) projecting to a length of four inches from its right branchial aperture. On looking into the wide-open mouth, the body of the *Zoarces* is seen to be bent sharply round, while its head is firmly impacted in the throat of the *Cottus*. It is

therefore clear that the latter, in trying to swallow a prey rather too big for its capacity, failed in the attempt, while the victim, in its struggles, passed its tail through the gill-slit of the would-be devourer—the encounter resulting in the death of both.

Cases of this kind do not seem to be very uncommon, and it is interesting to find that, in many of those of which I have heard, the tail of the captured fish bears a similar relation to the gill-opening of the equally unfortunate captor as in the instance described above. Professor M'Intosh, in his "Marine Invertebrates and Fishes of St. Andrews" (p. 182, pl. viii. Fig. 11), has recorded and figured a case in which a Broad-nosed Eel, twenty inches in length, was in like manner "done for" in attempting to make a meal of one of its own species; and here again the tail of the captured fish projects through the narrow branchial opening of the larger one, while its body, bent into a loop, projects from the mouth. Professor M'Intosh has also informed me of other instances which he has observed, in various species of fishes, since the publication of the work which I have quoted.

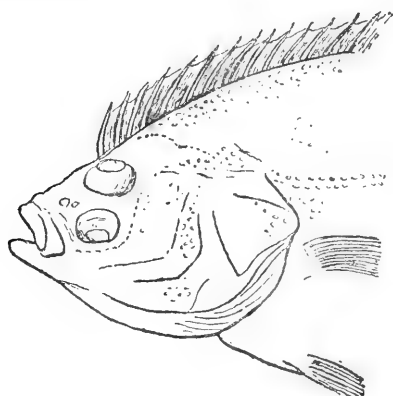
III. A FLOUNDER WITH THE EYES ON THE LEFT SIDE.

Every one knows that in the family of *Pleuronectidæ* or Flat-fishes, both eyes are placed on one side of the head—the right or left, as the case may be; the dorsal fin, however, pursues its course in the middle line, and in many genera passes actually in front of the region of the eyes. The anatomical relations of the parts concerned, as well as the embryonic development, show that this is effected by a bending over of the mesial plane of the head in the ocular region, carrying the eye of the "blind" side along with it—a torsion in which the dorsal fin, advancing from behind, does not take part. Young flat-fishes, on escaping from the egg, are quite symmetrical, but after the transference of the eye has taken place they swim on their side—the blind side, which is now the lower one, remaining white or pale in colour; while the ocular side, now the upper, becomes pigmented. Interesting malformations or arrestments of development are not uncommon, in which the turn of the eye has not

been completed, while the anterior extremity of the dorsal fin projects forward in the form of a pointed process. In such cases the fish is usually equally pigmented on both sides.

It might be considered to be a matter of indifference as to which of the eyes should leave its own side and pass over to the other, but, as a matter of fact, different groups of flat-fishes are characterised by a pretty constant position of the eyes on one side or on the other. For example, in the Halibuts, the Flounders, and the Soles, the normal position of the eyes is on the right side, while in the Turbots and in the Plagusiae they are found on the left.

Exceptions to the general rule of the group to which a flat-fish may belong are not uncommon. The appended cut shows a sketch of the head of a specimen of the Common Flounder (*Pleuronectes flesus*, Linn.) from the river Esk at



Musselburgh, in which the eyes, instead of being on the right side, as is normal for the genus, are on the left, as in a Turbot. In every other respect, except the transposition of the blind and ocular sides, the specimen is normal.

EXPLANATION OF PLATE I.

Fig. 1. Profile view of head of malformed Trout from Dunipace, showing the abnormally short lower jaw. Natural size.

Fig. 1a. The same head seen from below.

Fig. 2. Profile view of the head of another specimen, showing the lower jaw, of more than the usual length. Slightly reduced.

Fig. 2a. The same head seen from below, showing the want of symmetry in the right and left rami of the mandible.

SOME RECORDS OF SCOTTISH COLEOPTERA
AND HEMIPTERA.

By WILLIAM EVANS, F.R.S.E.

I. COLEOPTERA.

IT is now no easy matter to add to the list of Scottish Coleoptera, so well has this group of insects been already investigated in several of our faunal areas. A great deal, however, still remains to be done in working out the distribution of the various species known to occur in the country. This fact was impressed upon me during the publication of Canon Fowler's "Coleoptera of the British Islands," 1887-91, and since then I have devoted a good deal of time to beetle-hunting with the object of supplementing the published records. The number of specimens collected to date is fully 16,000, obtained chiefly in the Forth Area; but not a few are from the Strathspey district of "Moray," while Tweed, Clyde, and Argyll are each represented by some hundreds.

The serious part of the work has, as usual, been the identification of the specimens, and in this connection I owe a very deep debt of gratitude to my friend the Rev. Alfred Thornley, F.L.S., South Leverton, Notts. Had he not been willing to help me, a large portion of the collection would probably have had to remain unnamed. When I mention that he has examined about two-thirds of my captures, checking and completing my rough and imperfect lists or writing out original ones, it will be seen I am under no ordinary obligation to him.

My best thanks are also due to Dr. D. Sharp of Cambridge, who has kindly given me his opinion regarding a number of the more difficult species, a favour I greatly appreciate.

The number of species already recognised in the collection is rather more than 800, and many of them are from faunal areas from which they have not yet been recorded, the additions to the Forth district alone being over 100.

I hope some day, with Mr. Thornley's co-operation as regards at least one area, to see all these records published in a connected form; but there is still a great deal to do before that can be accomplished, and in the meantime it may be well to place on record a few of the more interesting occurrences.

In the matter of nomenclature I have followed Sharp and Fowler's "Catalogue of British Coleoptera," 1893.

a. Species not in Sharp's "Coleoptera of Scotland" ("Scottish Naturalist," 1871-81), and of which I am not aware of any subsequent Scottish records:—

Dromius meridionalis, Dej.—Brodict, Arran, April 1895, one example: identification confirmed by Mr. Thornley.

Eucommus hirticollis, Ill.—One found under stone lying in a mossy bog near foot of Loch Ard, Aberfoyle, South-west Perthshire, April 1896. Specimen shown to Dr. Sharp.

Halysia conglobata, L.—On May 1896 I beat an example of this "Ladybird" off an oak at Aberfoyle, Upper Forth; and in September 1897 another was obtained in the same locality: identification confirmed by Dr. Sharp. The species is not included in Sharp's "Coleoptera of Scotland," and Fowler ("Brit. Coleop.," vol. iii. p. 167) says: "Not uncommon in the midland and southern districts of England and in Ireland, but I can find no locality farther north than Sherwood Forest." The name *Coccinella conglobata* occurs, however, in Don's list of Forfarshire animals published in 1813; but, having regard to the confusion which at that time existed respecting many of the *Coccinellidæ*, there is every reason to believe that some other form (probably one of the numerous varieties of the common *C. variabilis*) was intended.

Scymnus mulsanti, Waterh. (? *S. redtenbacheri*, Muls.).—Four examples of a small, dark, reddish-legged *Scymnus*, which Dr. Sharp has named for me *S. mulsanti*, were obtained by sweeping grass on the edge of Luffness Marsh, East Lothian, on 30th June last.

Anommatus 12-striatus, Müll.—In September 1897 a single example of this minute, eyeless beetle was detected on the under side of a board which had been lying for some months on damp earth, Morningside, Edinburgh.

Monochammus sutor, L.—A ♂ example of this reputed British Longicorn, which was found crawling on the trunk of a tree in

Colinton Dell, near Edinburgh, in September 1878, is in my collection. It was named for me a number of years ago by Mr. C. O. Waterhouse of the British Museum. In all probability it had been imported from the Continent at some stage of its existence.¹

Donacia thalassina, Germ.—This pretty beetle was fairly common on *Eleocharis* and other water-plants in a pond at Drumshoreland, Linlithgowshire, on 1st June 1895. The localities given for it in Fowler's "British Coleoptera" are all in the south of England, and its occurrence in the Edinburgh district is therefore of very considerable interest. Determined for me by Mr. Thornley and confirmed by Dr. Sharp.

Haltica palustris, Weise.—A *Haltica* taken at Aberfoyle, Upper Forth, in May 1896, is referred by Dr. Sharp to this form. The localities mentioned by Canon Fowler are Wimbledon, the south of England, and the Manchester district.

Gnathocerus cornutus, F.—I have two ♂ specimens of this unmistakable form, both found in bread—one at North Berwick in August 1897, and the other (for which I have to thank Mr. R. Godfrey) in Edinburgh in July last. Although there does not appear to be any previous record of the species from Scotland, I suspect it is not very uncommon among flour in bakehouses, etc.

[*Aræocerus fasciculatus*, De Geer.—In June 1895 a living example of this foreign Anthribid was found in the Herbarium at the Botanic Garden, Edinburgh, by Mr. J. F. Jeffrey, and kindly sent to me. Dr. Sharp, to whom I am indebted for the name of this beetle, tells me it is "a widely distributed form at present; frequently occurring in Herbaria."]

b. Miscellaneous records of species already on the Scottish list. The majority of these appear to fill up district blanks. Many others might have been given had space allowed:—

Carabus arvensis, F.—One taken on the Pentland Hills above Colinton, 6th May 1899. This is the only occasion on which I have seen the species in the south of Scotland. In the Highlands, where it is not rare, I have obtained specimens at Aberfoyle, Glen Tilt, and Dalwhinnie. According to Wilson and Duncan ("Entomologia Edinensis," p. 69) it occurred

¹ This occurrence (together with the capture of another rare Longicorn, *Saperda carcharias*, L., at Cromdale, Strathspey, in August 1891) was recorded by me in this journal in 1892 (vol. i. p. 19).

sparingly on the Pentlands seventy years ago. *C. nitens*, L., is also still to be found on the Pentlands and adjoining moors, where I have met with it on several occasions (Bavelaw Moss, April 1885 and 30th March 1896; Bonaly Hill, May 1896), and I once found pieces of the elytra in the Kestrel's "pellet" on Dalmahoy Crags. Mr. Eagle Clarke tells me he captured a specimen on the path between Bonaly and Glencorse on 1st May 1892.

Elaphrus uliginosus, F.—One taken near Aviemore, Moray Area, May 1893. *E. lapponicus*, Gyll.—Several from hill west of Fearnan, Loch Tay, 4th May 1892.

Harpalus rubripes, Duft.—Aberdour, Fife, April 1893, nine specimens. *H. quadripunctatus*, Dej.—One from near foot of Ben-a-ghlo, September 1898.

Anisodactylus binotatus, F.—Aberfoyle, Upper Forth, May 1897, a single example.

Pterostichus striola, F.—Brodick, Arran, April 1895, several.

Amara consularis, Duft.—In July 1890 I took three examples in the neighbourhood of Peebles. It seems to be a rare species in Scotland. *A. alpina*, F.—In last year's volume of this journal (p. 54, 1899) I recorded the capture of two ♂s and a ♀ of this rare beetle on a hill up Glen Tilt, Perthshire, in September 1898.¹ Besides the Rannoch and Braemar localities to which I alluded, the species has also occurred near Aviemore ("Ent. Mo. Mag.," 1874, p. 64, etc.). *A. similata*, Gyll.—Mr. Thornley reports two examples of this form among my captures, both taken in Fife in 1893—one at Aberdour in April, the other near Leven in August. The only previous Scottish record seems to be that of Messrs. Lennon and Douglas for the Solway Area ("Annals," 1892, p. 108).

Bembidium concinnum, Steph.—Half a dozen along with *Cillenus lateralis* under stones at the mouth of the Esk, Musselburgh, October 1899.

Dromius melanocephalus, Dej.—A few examples from near Aberlady (May 1890 and September 1893), Mortonhall, March 1896, and Hillend, near Edinburgh, April 1896. Sir A. Buchan-Hepburn recorded it for "Forth" in "Scottish Naturalist," iv. p. 248. *A. nigriventris*, Thoms.—Is not uncommon in the Edinburgh district.

¹ In the same note I recorded a few other beetles got in the Glen Tilt district of Perthshire in September 1898, namely—*Carabus arvensis*, *Miscordera arctica*, *Harpalus quadripunctatus*, *H. latus*, *Pterostichus athiops*, *Cymindis vaporariorum*, *Aphodius fetidus*, *Otiorrhynchus maurus*, and *O. blandus*; also *Coccinella 5-punctata* from banks of the Garry below Blair-Atholl.

- Hydroporus morio*, Dej.—Bavelaw Moss, April 1893, one specimen ; Torduff Hill, Pentlands, March 1896, two. *H. longulus*, Muls.—Dreghorn Glen, Pentlands, March 1897, one in wet moss by side of stream. *H. discretus*, Fairm.—One from muddy hole beside Glencorse Reservoir, Pentlands, May 1896.
- Agabus affinis*, Payk.—Mr. Thornley, who has taken great trouble in the determination of the obscure *Hydropori* and *Agabi*, comparing them with specimens in Canon Fowler's collection, reports two examples of this very local form among my captures—one from Torduff Hill, Pentlands, March 1896, and one from near Dollar, April 1897.
- Dytiscus punctulatus*, F.—Philipstoun Loch, Linlithgowshire, October 1890.
- Chaetarthria seminulum*, Herbst.—Aberfoyle, April ; Luffness Links, September ; and Boghall Glen, Pentlands, November, all in 1896.
- Helophorus rugosus*, Ol.—St. Andrews, July 1890, one.
- Cercyon flavipes*, F.—Taken in a number of localities in the three Lothians.
- Aleochara cuniculorum*, Kr.—Luffness Links, three on dead rat, September 1896 ; Kinraig, Speyside, August 1889.
- Myrmedonia humeralis*, Grav.—Loch Ard side, Upper Forth, April 1896, one.
- Astilbus canaliculatus*, F.—Near Midcalder, February 1897.
- Encephalus complicans*, Westw.—Taken in Midlothian on three occasions : Glencorse, October 1896 ; Ratho, November 1896 ; and Kirknewton in May last.
- Quedius mesomelinus*, Marsh.—Roslin, October 1896, and Arniston, February 1897 ; a specimen shown to Dr. Sharp is referred by him to var. *fageti*, Thoms. According to Fowler, this species is widely distributed in Scotland, but it cannot be said to have a definite place in Sharp's "Coleoptera of Scotland." Its close ally, *Q. fulgidus*, F., I have taken at Peebles, Aberdour, and Gullane. *Q. tristis*, Grav.—Murray's statement (which has been questioned) that this species is common in Scotland is certainly true as regards the Edinburgh district. The following are my own records : Aberlady, September 1888 ; Arthur's Seat, February 1889, etc. ; Colinton, Ravelrig, Penicuik, October, and Rosythe Castle, near North Queensferry, November, 1896 ; Dirleton, January, Isle of May, July and September, 1897 ; Binny Craig, Linlithgowshire, March 1898 ; Mortonhall, March 1900. I have also taken it in Moray

(Kincaig), and it is on record from Lewes and Hoy. So far back as 1876 the late W. A. Forbes recorded it as common on Arthur's Seat ("Scot. Nat.," iii. p. 316). *Q. fuliginosus*, Grav., is equally common in "Forth." *Q. auricomus*, Kies.—Innerleithen, January; Pentlands above Dreghorn, March 1897; Bonaly Glen, April 1898—among moss in running water.

Philonthus splendens, F.—Near Kingussie, August 1889; Longniddry, February 1896; Aberfoyle, September 1897. *P. lucens*, Er.—Aberfoyle, two, May 1897. *P. scymbalarius*, Nord. (*longicornis*, Steph.).—Dollar, April 1897, one. Recorded from East Lothian by Sir A. Buchan-Hepburn ("Proc. Berw. Nat. Club," vol. viii.).

Cafius fucicola, Curt.—Under rotting seaweed, Aberdour, Fife, March 1896, February 1899, and 10th March 1900 (common). On the last occasion it and *C. xantholoma*, Grav., occurred together in about equal numbers; one example of the latter species is var. *variolosus*, Sharp. Murray's record of *fucicola* from Dalmeny was doubted by Dr. Sharp (to whom I have shown one of my specimens), but afterwards confirmed by the late R. F. Logan ("Ent. Mo. Mag.," xxiii. p. 161). Recorded also from Tyne estuary, East Lothian, by Sir A. Buchan-Hepburn, and from Machrihanish ("E.M.M.," 1896, p. 111).

Xantholinus distans, Kr.—A pale *Xantholinus* taken by me on Luffness Links, in August 1896, and named *distans* (?) by Mr. Thornley, who has recorded the form from Caithness, is in Dr. Sharp's opinion referable to that form.

Stilicis affinis, Er.—Mortonhall, North Queensferry, and Lanark.

Dianous cœrulescens, Gyll.—Fairly common in dripping moss at side of a tiny waterfall, Bonaly ravine, Pentlands, April 1898.

Stenus bimaculatus, Gyll.—Old quarry near Longniddry, September 1897. *S. guynemeri*, Duv.—Ochils above Dollar, April 1897, and Bonaly ravine, Pentlands, April 1898, in moss on waterfalls. *S. pusillus*, Er.—Common in Edinburgh district in October and November, 1896. *S. pubescens*, Steph., and *S. binotatus*, Ljun.—Both taken in Moray district (Kincaig), and likewise in Forth.

Coprophilus striatulus, F.—Fearnan, Loch Tay.

Geodromicus nigrita, Müll.—Pool on Largo Links, June 1897, one.

Coryphium angusticolle, Steph.—Rosslyn, October 1896, one.

Eusphalerum primulae, Steph.—Common in flowers of primrose, Arniston grounds, 12th May 1898. Recorded from Polmont by Dr. Sharp (Thesis in Edinburgh University).

Pselaphus heisei, Herbst.—Aberfoyle, April 1896, one specimen.

Agathidium varians, Beck.—Dalmeny, January 1899, one. *A. marginatum*, Sturm.—Luffness, August 1896, one.

Necrodes littoralis, L.—Brodick, Arran, April 1895.

Silpha nigrita, Cr.—Doune (Forth), May 1889; Kincaig and Cromdale (Moray); and Arran. *S. dispar*, Hbst.—Kincaig, several.

Sphærites glabratus, F.—Fearnan, Loch Tay, May 1892, one.

Hister succicola, Thoms., and *H. neglectus*, Germ.—Aberfoyle (Forth), April 1896. *H. cadaverinus*, Hoff.—Cromdale; Brodick.

Onthophilus striatus, F.—Fearnan (Tay); Callander, etc.

Anatis ocellata, L.—Leven (Forth), August 1893, one; Blair-Atholl.

Halysia 18-*guttata*, L.—Aviemore, August 1893; fairly common in Forth.

Nitidula bipustulata, L.—Aberfoyle (Forth), May 1897.

Omosita colon, L.—Luffness (Forth), July 1898. *O. discoidea*, F.—Aberdour, Fife, one under rotting seaweed, February 1899.

Rhizophagus perforatus, Er.—Rosslyn, October 1896; Morningside, July 1897. Recorded from East Lothian by Sir A. Buchan-Hepburn.

Attegenus pello, L.—Leven (Fife), August 1893, one.

Byrrhus dorsalis, F.—Fearnan (Tay), May 1892; Hillend Hill, Pentlands, April 1896.

Heteroceris femoralis, Kies.—Common in tiny burrows in firm muddy sand at the head of Aberlady Bay. In August 1896 I found them in all stages (larva, pupa, and imago) on the same day. The spot, which is covered more or less with a thin growth of green seaweed (*Enteromorpha compressa*), and thousands of tiny molluscs (*Hydrobia ulvæ*), is under water for some time twice a day during spring tides. Species determined for me by Dr. Sharp.

Sinodendron cylindricum, L.—In August 1889 I took several examples of this fine beetle at Kincaig, Inverness-shire.

Aphodius fossor, L.—Fearnan, Loch Tay, May 1892, one ♂. *A. constans*, Duft.—Aberfoyle, in cow-dung, April 1896 and May 1897, a good many. Recorded from East Lothian by Sir A. Buchan-Hepburn. *A. tessulatus*, Payk.—Inverkeithing, Fife, October 1896; Kirknewton, Midlothian; Kincaig (Moray), 1889. *A. conspurcatus*, L.—Bavelaw, Midlothian, March 1893, one; Kincaig and Aviemore.

- Geotrupes typhæus*, Latr.—Three taken by me near Brodick, Arran, in April 1895 (see my note in "Annals," 1895, pp. 198 and 254).
- Serica brunnea*, L.—Luffness, Aberfoyle, etc. (Forth); Cromdale.
- Melolontha vulgaris*, F.—Near Loanhead, Midlothian, May 1882, one.
- Trichius fasciatus*, L.—Mr. L. W. Hinxman, who has given me a couple of Bee-beetles taken at Aviemore in July 1895, tells me they were common there that year. I have only taken it at Rannoch.
- Lacon murinus*, Lap.—Pettycur, Fife, June 1889, and again in 1897.
- Limonium minutus*, L.—Arniston and Hillend, near Edinburgh.
- Adrastus limbatus*, F.—From several localities in Edinburgh district.
- Campylus linearis*, L.—Kirknewton, June 1895; Fala (Forth), July 1897.
- Dascillus cervinus*, L.—Tushielaw (Tweed), 1889; Aberfoyle (Forth), 1896.
- Cyphon pallidulus*, Boh.—Luffness Marsh, July 1898, common.
- Eros aurora*, Herbst.—Aviemore (Moray), June 1893, common (see my note in "Annals," 1893, p. 249).
- Lampyris noctiluca*, L.—I have taken the Glow-worm in Forth (Pass of Leny and Aberfoyle), Tweed (Tushielaw, in abundance), and Argyll (Oban).
- Podabrus alpinus*, Payk.—Kirknewton, Midlothian, June 1895; Heriot, etc.
- Telephorus paludosus*, Fall.—Heriot, June 1898, three; Aviemore.
- T. flavilabris*, Fall.—Bavelaw and Luffness (Forth).
- Rhagonycha unicolor*, Curt.—Rosslyn, July 1893, one specimen, identified by Mr. Thornley. *R. fulva* is common in Forth.
- Malthodes dispar*, Germ.—Near Rosslyn, July 1893, one, identified by Mr. Thornley. *M. pellucidus*, Kies.—Arniston, July 1897.
- Necrobia ruficollis*, F.—Dreghorn, near Edinburgh, July 1894, one.
- Ernobius mollis*, L.—Larvæ from which I reared this beetle were abundant on a rustic bridge, Blackford Hill, Edinburgh, November 1896; Aviemore.
- Cis punctulatus*, Gyll.—Morton, near Edinburgh, October 1896, common under bark of dead pine; Swanston Wood, November.
- Asemum striatum*, L.—Kincraig (Moray), two, August 1889.
- Pachyta sexmaculata*, L.—Loch Morlich, near Aviemore, June 1893, one specimen (see my note, "Annals," 1893, p. 249).

- Saperda carcharias*, L.—Cromdale, Strathspey, one on aspen, August 1891 ("Annals," 1892, p. 78).
- Donacia obscura*, Gyll.—In June 1893 I took an example of this rare species near Aviemore, Inverness-shire; identification confirmed by Dr. Sharp. *D. sericea*, L., and *D. discolor*, Panz.—I have both from Forth and Moray, and the latter also from Clyde (Arran).
- Chrysomela marginata*, L.—Kincraig, August 1889. *C. hæmoptera*, L.—Aberlady, September 1893, one. *C. fastuosa*, Scop.—One taken near Edinburgh, in 1884. *C. polita*, L., is not uncommon in Forth.
- Hydrothassa aucta*, F., and *H. marginella*, L.—Both from Moray; the latter also from Forth (Glencorse Reservoir, Pentlands).
- Adimonia tanaceti*, L.—Common in flood refuse, Loch Inch, Spey, August 1889.
- Longitarsus holsaticus*, L.—Aberfoyle, September 1897, three. I have submitted many specimens belonging to this difficult genus and its allies to Mr. Thornley, who will, I hope, send a report on them to the "Annals" by and by. What seems to be *L. luridus*, Scop., occurs on Luffness Links. Fowler says "not recorded from Scotland." Buchan-Hepburn, however, recorded it as "not uncommon" in East Lothian more than twenty years ago.
- Phyllotreta undulata*, Kutz. (specimen shown to Dr. Sharp), is common in the Edinburgh district. I mention this in view of Fowler's remark in "Brit. Coleop."
- Mniophila muscorum*, Koch.—Penicuik Woods, October 1896; Bridge of Allan, February 1897.
- Cassida flaveola*, Thunb.—Aberfoyle, September 1897. *C. viridis*, F., is common at Tynninghame and Luffness Links, and I have seen specimens from Peebles.
- Helops striatus*, Fourc.—Near Brodick, Arran, April 1895, two.
- Rhinosimus ruficollis*, L.—Forth (Mortonhall, Comiston, etc.).
- Anaspis rufilabris*, Gyll.—Forth (Arniston, Dalmahoy, Oakley).
- Notoxus monoceros*, L.—Dunbar and Luffness Links.
- Anthicus scoticus*, Rye.—Common on St. Serf's Island, Loch Leven, May 1898.
- Rhinomacer attelaboides*, F.—Rothiemurchus, May 1893.
- Rhynchites æneovirens*, Marsh.—Aberfoyle, one off oak, May 1896. Recorded from near Stirling in 1844 by R. N. Greville ("Zool," p. 699).

- Apion cruentatum*, Walt.—Dunbar, September 1890. I have also taken in the Edinburgh district *A. hæmatodes*, Kirby, *A. striatum*, Kirby, *A. violaceum*, Kirby, etc., not given for Forth in Sharp's "Coleoptera of Scotland."
- Oliorrhynchus atroapterus*, De G.—St. Andrews (Tay); Pettycur and Aberlady. *O. septentrionis*, H.—Aviemore. *O. sulcatus*, F.—Edinburgh, Aberlady, St. Andrews, and Arran. *O. rugifrons*, Gyll.—Pettycur; Isle of May, July 1897, common.
- Trachyphlæus scaber*, L.—Hillend Hill, Pentlands, April 1896, one.
- Exomias araneiformis*, Schr.—Near Stirling, 1887, one; Broxburn, one, which I have shown to Dr. Sharp, taken by Mr. R. Godfrey in April 1899. Mr. Anderson Fergusson has recorded it from Clyde and Solway ("Annals," 1897, p. 48), so that Murray's "occasional" in Scotland has now been fully confirmed.
- Brachysomus echinatus*, Bonsd.—From Forth and Moray.
- Barypeithes sulcifrons*, Boh.—Blackford Hill, Mortonhall, etc.
- Liophilæus nubilus*, F.—Comiston, Aberlady, Dollar.
- Sitones cambricus*, Steph.—Aberfoyle, May 1897, one. Determined by Mr. Thornley. *S. lincellus*, Gyll.—Pettycur, May 1895, one; Glencorse, November 1896, one. *S. sulcifrons*, Th., is common in Forth.
- Hypera punctata*, F.—Forth. *H. plantaginis*, De G.—Forth and Moray.
- Cleonus sulcirostris*, L.—Luffness, Tynninghame, and Largo Links.
- Liosoma ovatum*, Clairv.—Forth (Mortonhall, Roslin, Aberfoyle, etc.).
- Pissodes pini*, L.—Elgin. *P. notatus*, F.—Aviemore.
- Grypidius equiseti*, F.—Luffness Marshes, August 1896 and July 1898.
- Erirrhinus æthiops*, F.—Loch Inch (Moray), August 1899, common in flood refuse.
- Tychius venustus*, F.—Aviemore, May 1893, common on broom.
- Gymnetron labilis*, Herbst.—Aberfoyle, September 1897, three.
- Cionus scrophulariæ*, L.—Arniston, Thornton, Inverkeithing; Kirkintilloch. *C. pulchellus*, Herbst.—Arniston, May and June 1898, common.
- Acalles ptinoides*, Marsh.—Aberfoyle, September 1897, one.
- Ceuthorrhynchus chalybæus*, Germ.—Mortonhall, October 1896, etc. *C. rugulosus*, Herbst.—Luffness Marsh, August 1896, one. Identified by Thornley and confirmed by Sharp.

- Ceuthorrhynchidius quercicola*, Payk.—Mortonhall, Glencorse, etc.
Rhinoncus pericarpus, L.—Forth (Hillend near Edinburgh, and Aberfoyle).
Litodactylus leucogaster, Marsh.—Otterston Loch, Fife, April 1893 ; Longniddry quarry, July 1897.
Limnobaris T-album, L.—Forth (Luffness, Longniddry, Thornton).
Magdalis phlegmatica, H.—Kincraig (Moray), August 1889, one.
Rhyncolus ater, L.—Kincraig, August 1889, common.
Hylesinus crenatus, F.—Roslin, Colinton, and Dollar.
Pityogenes bidentatus, Hbst.—Luffness, September 1893 ; Rosslyn, October 1896.

II. HEMIPTERA.

Along with the Coleoptera I have also collected some thousands of Hemiptera (Bugs and Froghoppers) ; and, thanks to Mr. Edward Saunders, F.L.S., whose ever ready and invaluable help it gives me sincere pleasure to acknowledge here, the majority of those belonging to the section Heteroptera have already been named. As yet, however, I have not been able to make much progress with the identification of the Homoptera, and only a few submitted to Mr. G. B. Buckton a number of years ago have been authoritatively determined.

The following are a few of the more interesting captures. In both sections there are several species that do not appear to have been previously recorded from Scotland ; at any rate they have no Scottish localities assigned to them in the recent works of Saunders, Buckton, and Edwards, or in the Perthshire lists of M'Gregor and Kirkcaldy ("Annals," 1893-94, and "Trans. Perths. Soc. Nat. Sc.," ii. p. 6, and iii. p. 1).

a. HETEROPTERA.

- Pentatoma baccarum*, L.—Pettycur, Fife ; Burnmouth, Berwickshire.
Piezodorus lituratus, F.—Near Dunbar, September ; Oban, April.
Zicrona cærulea, L.—Bridge of Allan, December 1893 ; Aberfoyle, September 1897 ; Glen Tilt ("Annals," 1899, p. 54).
Berytus signoreti, Fieb.—Luffness ; Edgelaw, Midlothian.
Macrodemus micropterum, Curt.—Pentlands, March 1894.

- Scolopostethus neglectus*, Edw.—Lothianburn, near Edinburgh, April 1896, common, including an example of the very rare developed form.
- Notochilus contractus*, H.S.—Arthur's Seat, March 1898, several.
- Orthostira cervina*, Germ.—Rosslyn, October 1897; Blair-Atholl, September 1898. *O. parvula*, Fall.—Morton and Braid Hills, Edinburgh.
- Hydrometra stagnorum*, L.—Otterston, Fife, April 1893; Loch Ard, Perthshire, April 1896, and again in 1897, common. Recorded by me in "Annals" for 1897, p. 49. Messrs. M'Gregor and Kirkcaldy's record ("Trans. P. N. S.," 1899), based on specimens from Loch Ard sent by me to the Perth Museum, was, therefore, not the first for Scotland; but neither was mine, for as long ago as 1813, Don recorded "*Cimex stagnorum*" from Forfarshire (Headrick's "Agriculture of Angus," Appendix).
- Salda lateralis*, Fall., and *S. pallipes*, Fab.—Luffness salt marshes. *S. riparia*, Fall.—Roslin. *S. cocksi*, Curt.—Aberfoyle.
- Lytocoris campestris*, Fab.—Dreghorn, February 1898, common.
- Tetraphleps vittata*, Fieb.—Roslin; Tynninghame.
- Microphysa pselaphiformis*, Curt.—Kirknewton.
- Pithanus mærkeli*, H.S.—Developed form, Gullane, July 1898.
- Teratocoris antennatus*, Boh.—Luffness Links, July 1898, one.
- Phytocoris ulmi*, L.—Tynninghame, Otterston, etc.
- Calocoris striatus*, L.—Corstorphine Hill, June 1895, one.
- Lygus viridis*, Fall.—Rosslyn; Heriot. *L. pastinacæ*, Fall.—Tynninghame.
- Bothynotus pilosus*, Boh.—Falkland, August 1895, ♂, very rare.
- Philophorus clavatus*, L.—Aberfoyle, September 1897, one.
- Dicyphus constrictus*, Boh.—Yester, East Lothian, September 1896, two; very rare in Britain. *D. epilobii*, Reut.—Longniddry; Luffness. *D. annulatus*, Wolff.—Tynninghame.
- Campyloneura virgula*, H.S.—Tynefield and Luffness, East Lothian.
- Cyrtorrhinus caricis*, Fall.—Tynninghame, Blair-Atholl, etc.
- Phylus palliceps*, Fieb.—Rosslyn, July 1893, one, among *P. melanocephalus*.
- Nepa cinerea*, L.—Braid ponds; Canal, Edinburgh; Oban.
- Corixa hieroglyphica*, Duf.—Luffness marshes.

b. ORTHOPTERA.

- Aphrophora alni*, Fall.—Rosslyn ; Aberfoyle ; Grantown, etc.
Ulopa reticulata, Fab.—Pentlands ; Tynehead ; Aberfoyle, etc.
Megophthalmus scanicus, Fall.—Rosslyn ; Aberlady.
Tettigonia viridis, L.—This fine species was taken at Rosslyn in July 1893, and at Aberfoyle in 1897.
Eupelix cuspidata, Fab.—Leven and Falkland, Fife.
Accephalus albifrons, L.—Rosslyn, Bavelaw ; Leven, etc. *A. histrionicus*, F.—Luffness and North Berwick Links.
Thamnotettix cruentata, Panz.—Aberfoyle ; Cromdale ; on aspen (see Buckton's remarks on my specimens, "Brit. Cicadæ," ii. p. 194).
Eupteryx aurata, L.—Braidburn, etc. *E. vittata*, L.—Leven. *E. concinna*, Germ., *E. urticae*, F., and *E. notata*, Curt.—Aberlady.
Typhlocyba tenerrima, H.S.—Aberlady.

TOPOGRAPHICAL BOTANY OF SCOTLAND.

By JAMES W. H. TRAIL, A.M., M.D., F.R.S.

(Continued from p. 42.)

[Names of plants in *italics*, except as synonyms within curved brackets, denote that the plants were *certainly* introduced into Scotland by man. † after a district-number denotes introduction by man into the district ; "cas." denotes casual occurrence, and "esc." evident escape or outcast from cultivation, both being due to man's agency. Square brackets enclosing the name of a plant or a district-number denote that the record was made in error. ? after a district-number denotes, at least, need of confirmation ; after † it denotes doubt as to whether the plant owes its presence in the district to man. Corrections and additions to the records now published will be gratefully received and acknowledged by the compiler, whose earnest wish it is to supply an accurate statement of our present knowledge of the distribution of the uncultivated plants of Scotland, whether native or introduced by man intentionally or casually.—J. W. H. T.]

GYMNOSPERMS.

CONIFERÆ.

Juniperus communis, L., *except* 78, 79, 84, 85.

var. *b. intermedia*, Nyman, 110.

J. nana, Willd., 75, 76 (?), 87-90, 92, 94, 96-112.

Taxus baccata, L., has been recorded from 72-78, 81, 83, 85-88, 90-92, 95-99, 101 ; but it has been so long a favourite for

planting near churchyards and houses that its claims to be reckoned indigenous in most of these vice-counties are very doubtful.

Pinus sylvestris, *L.* Recorded from almost every vice-county *except* 110, 111, 112; but H. C. Watson, in "Top. Bot.," ed. 2, admits it as native only in 88, 89, 92, 95, 96, 97, 103, 105, 108, and "possibly in a few others."

Larix europæa, *L.*, and *Picea excelsa*, *Link.*, are met with often in places such as to make them appear like natives, and *Abies pectinata*, *DC.*, is also very widely distributed. It seems useless to enumerate vice-counties for these, or to name the other conifers met with in so many plantations, but which are seldom if ever seen in Scotland except where planted.

CRYPTOGAMS.

FILICES.

Hymenophyllum tunbridgense, *Sm.*, 72, 76-78, 86, 97-103, 105 (?).
112.

H. unilaterale, *Bory.*, 72-76, 78, 85-90, 92, 97-105, 108, 110-112.
Trichomanes radicans, *Sw.*, 98, 100. The claims to be reckoned native are not certain.

[*Adiantum Capillus-Veneris*, *L.*, has been recorded, in error, from 91 and 100.]

Pteris aquilina, *L.*, all.

Cryptogamme crispa, *R. Br.*, *except* 82, 83, 84, 94, 95, 101, 102, 107, 109†, 111, 112. (Moore gives it for Morayshire, 95.)

Lomaria spicant, *Desv.* (= *Blechnum boreale*, *Sw.*), all.

Asplenium Adiantum-nigrum, *L.*, *except* 78.

var. *obtusum*, *K. and M.*, 105.

A. marinum, *L.*, *except* 77, 78, 79, 80, 82, 83, 84, 86, 87, 88, 89, 92 (?), 96. (Moore gives this from "near Queensferry," in 83.)

A. viride, *Huds.*, 72, 73, 75, 77, 83, 85-90, 92, 94-100, 104-106, 108, 112 (103, "Ben More, Isle of Mull," Moore's "N. P. Brit. Ferns." Reported by S. Archibald from "Devon Glen" in 76.)

A. Trichomanes, *L.*, *except* 107, 112.

A. Ruta-muraria, *L.*, *except* 112.

var. *c. pseudo-germanicum*, *Milde*, 105, 108.

A. germanicum, *Weiss*, 80, 83 (?), 85, 89, (90, "? near Airlie," Moore's "N.P.B.F.")

A. septentrionale, *Hull*, 80, 83, 89, 92 (105 ?).

Athyrium Filix-fœmina, *Roth*, all.

b. *erectum*, *Syme*, 74.

var. *rheticum*, *Roth*, 97, 109, 110.

A. alpestre, *Milde*, 86-90, 92, 94, 96-98, 107, 108.

A. flexile, *Syme*, 88, 90, 94, 96, 97, 108.

- Ceterach officinarum*, *Willd.*, 72-76, 77 (?), 81 (?), 88, 89, 98, 99, ("Iona," in 103, Moore's "N.P.B.F.).
- Scolopendrium vulgare*, *Symons*, *except* 78, 82, 84, 106, 107 (?), 109 († ?).
- Woodsia ilvensis*, *R. Br.*, 72, 88, 90 (95, "Forres," Moore's "N.P.B.F.," probably an error).
- W. hyperborea*, *R. Br.*, 87 (Glen Falloch), 88, 90, 98, 104 (72, error).
- Cystopteris fragilis*, *Bernh.*, *except* 78, 101, 112.
- var. *b. dentata*, *Hook.*, T. Moore, in "Nature-printed British Ferns," enumerates localities for this variety in 72, 73, 84, 88, 90, 92, 96, 97, 109, 111. It has been also recorded from 75, 86, 93, 98, 101, 105.
- C. alpina*, *Desv.*, *b. Dickieana*, *Milde* (89? near Dunkeld), 91.
- C. montana*, *Bernh.*, 86, 88, 90, 92, 98 (and, in error, 94).
- Polystichum Lonchitis*, *Roth*, 72, 86-90, 92, 94-99, 103 ("Ben More, Isle of Mull," T. Moore, *l.c.*) 104-109, 111. (77, in error.)
- P. lobatum*, *Presl*, *except* 84, 110, 112.
- var. *b. aculeatum*, *Syme*. This has not been kept clearly distinct from the type in the published records. T. Moore (*l.c.*) has largely supplied those given below—72-74, 76, 77, 81, 83, 85, 86, 89-92, 97-102, 104, 105. Dr. Boswell-Syme says of it, in "English Botany," ed. 3, "probably not extending north to Scotland."
- P. angulare*, *Presl*, 74-76, 80, 81 (83, 98, T. Moore, *l.c.*), 100, 101.
- Lastrea Thelypteris*, *Presl*, 88†, 90, 112 (?).
- L. Oreopteris*, *Presl*, *except* 82, 84.
- L. Filix-mas*, *Presl*, all.
- var. *b. affinis*, *Bab.*, enumerated by T. Moore (*l.c.*) from localities in 77, 81, 85, 88, 89, 91, 98, and by Mr. Druce from Ullapool in 105.
- var. *c. paleacea*, *Moore*, 72-74, 76, 85-89, 90 ("Clova," T. Moore), 97-100 (T. M.), 104, 105, 108, 111.
- var. *d. pumila*, *Moore*, 105.
- var. *e. abbreviata*, *Bab.*, 72, 76, 90, 108.
- L. cristata*, *Presl*, 74†, 76† (reported from 84 and 92 in error). (*L. uliginosa*, *Newman*, reported from 91 in error.)
- L. spinulosa*, *Presl*, *except* 77, 78, 79, 81, 82, 84, 93, 94, 95 (?), 107, 109, 111, 112.
- L. dilatata*, *Presl*, all.
- var. *b. tanacetifolia*, *Moore*, 72, 92, 98, 99 (last three *fide* T. Moore, *l.c.*).
- var. *c. dumetorum*, *Moore*, 72, 92, 98-100, 106, 109 (last six *fide* T. Moore, *l.c.*).
- var. *d. collina*, *Moore*, 72, 90, 98-100 (last four *fide* T. Moore, *l.c.*).
- var. *e. alpina*, *Moore*, 86, 88, 92, 109, 111.

- L. æmula*, *Brackenridge*, 75, 80 (?), 81 (?), 89, 90 (?), 96-100, 102-105, 109 (?), 110, 111.
Polypodium vulgare, *L.*, all.
 var. *b. serratum*, *Willd.*, 73 (T. Moore, *l.c.*), 75, 86 (T. Moore, *l.c.*).
 var. *breve*, *Lange*, 105, 112.
Phegopteris Dryopteris, *Fée*, except 82, 110, 111.
P. calcarea, *Fée* (= *P. Robertiana*, R. Br.), 88 († ?), 92†, 93 (? error), 109 (?).
P. polypodioides, *Fée* (= *Polypodium Phegopteris*, L.), except 78, 82, 93.
Osmunda regalis, *L.*, except 78, 79, 80, 83, 89, 90 (?), 92, 93, 94, 95, 96, 106, 107, 111.
Ophioglossum vulgatum, *L.*, except 78, 90 (?), 94, 96, 97, 99, 103, 104, 105 (?), 106, 107, 108, 109.
 var. *b. polyphyllum*, *Braun* (= *O. ambiguum*, Coss. and Germ.), 110, 111, 112.
Botrychium Lunaria, *L.*, except 78.
B. matricariæfolium, *A. Br.*, 75.
 b. lanceolatum, *Angstr.*, 90 (?).

EQUISETACEÆ.

- Equisetum maximum*, *Lam.*, 73-77, 81, 83, 85 (?), 90 (?), 98-102, 104, 105, 111 (?).
 var. *b. serotinum*, *Braun*, 74.
E. arvense, *L.*, all.
 var. *b. alpestre*, *Wahlenb.*, 72, 88, 112.
 var. *c. nemorosum*, *Braun*, 107.
E. pratense, *Ehrh.*, 72, 77, 83-92, 94, 98, 109, 110.
E. sylvaticum, *L.*, except 78.
 var. *b. capillare* (*Hoffm.*), 88, 93, 95, 96, 98, 105, 108.
E. palustre, *L.*, all.
 var. *b. polystachyum*, *Auct.*, 72, 75, 88, 91.
 var. *c. nudum*, *Newman*, 90, 109. Probably not uncommon.
E. limosum, *Sm.*, all.
 var. *b. fluviatile* (*L.*), 72, 104, 112.
E. hyemale, *L.*, 72, 73, 75, 77, 81, 83, 87-91, 92 (?), 94-96, 106, 108.
E. variegatum, *Schleich*, 77, 82, 85, 86 (?), 88-92, 98, 100, 106.
 var. *a. arenarium*, *Newman*, 104, 108, 110.
 var. *b. majus*, *Syme*, 91, 110.

LYCOPODIACEÆ.

- Lycopodium Selago*, *L.*, except 78, 84, 85.
 var. *b. recurvum*, *Desv.*, 90, 105.
 var. *appressum*, *Desv.*, 105.

- L. inundatum*, *L.*, 75, 85, 87-92, 95, 96, 99, 105, 106, 108, III.
L. annotinum, *L.*, 72, 88-92, 94, 95, 97, 98, 100, 103, 105, 107, 109, III.
L. clavatum, *L.*, *except 82, 84, 101, 102, 107, 110.*
L. alpinum, *L.*, *except 82, 84, 85, 103, 107.*
 var. b. decipiens, *Syme*, 88, 90, 94, 96-98, 100, 102, 104, 105.

SELAGINELLACEÆ.

- Selaginella selaginoides*, *Gray*, *except 78, 84.*
Isoetes lacustris, *L.*, 72-75, 85-90, 92, 94, 96, 97, 99-101, 103, 104 (?), 105, 107, 109 (?), III (?), 112.
 var. falcata, *Lange*, 105, 112.
I. echinospora, *Dur.*, 87, 91, 92, 99, 103-105, 108, 110.

MARSILEACEÆ.

- Pilularia globulifera*, *L.*, 72-77, 83-85, 87-92, 95, 98, 99, 104, 107, 110.

CHARACEÆ.

- Chara fragilis*, *Desv.*, *except 72, 76, 78, 81, 84, 91, 93, 94, 102.*
 var. b. barbata, *Gant.*, 73, 79, 81, 86, 92, 100, 105, 106, 109-111.
 var. c. capillacea, *Coss. and G.*, 72, 86, 88, 89, 110.
 var. d. Hedwigii, *Kütz.*, 72, 80, 89, 90, 93.
 var. e. delicatula, *A. Br.*, 73, 79, 80, 86-88, 92, 97, 98, 101-104, 108-112.
 var. f. Sturrockii, *H. and J. Groves*, 89.
C. aspera, *Willd.*, 79, 85, 87-90, 96, 103, 108-112.
 var. b. capillata, *Braun*, 111.
 var. d. subinermis, *Kütz.*, 85, 89, 103, 111.
C. polyacantha, *Braun*, 73, 74, 79, 80, 85.
C. contraria, *Kütz.*, 74, 82, 85, 90, 100, 103, 104, 109.
 var. b. hispidula, *Braun*, 85.
C. hispida, *L.*, 81, 89, 90, 95, 96, 101, 103, 108, 110, 111.
 var. b. macracantha, *Braun*, 90.
 var. d. rudis, *Braun*, 80, 82, 89, 95, 96.
C. vulgaris, *L.*, 73, 74, 79, 80, 82, 83, 85-87, 89, 90, 95, 96, 98, 103, 108-112.
 var. b. longibracteata, *Kütz.*, 89, 90, 98, 109, 111.
 var. c. papillata, *Walt.*, 96, 98, 100, 103.
 var. d. atrovirens (*Lowe*), 89, 90, 111.
 var. e. melanopyrena, *H. and J. Groves*, 100, 109.
Tolypella glomerata, *Leonh.*, 90, 109.
Nitella Nordstedtiana, *H. and J. Groves*, 110.

N. translucens, *Agardh.*, 72, 73, 86, 87, 89, 92, 97, 103, 107,
110.

N. flexilis, *L.*, 72, 73, 86, 87, 89, 96-99, 111.

var. *b. crassa*, *Braun*, 87-89.

var. *c. nidifica*, *Wallm.*, 89.

N. opaca, *Agardh.*, except 76, 84, 93, 94, 95, 99, 100, 101.

(*To be continued.*)

CONTRIBUTION TOWARDS A FLORA OF CAITHNESS. No. III.

PLANTS OF STROMA ISLE, PENTLAND FIRTH.

By ARTHUR BENNETT, F.L.S.

THE island of Stroma is situated in the channel between the north coast of Caithness and the Orkney Isles. It lies about three miles from the coast of the mainland at Canisbay, about four miles south of Swona, and about seven miles from South Ronaldshay. Its name in the Old Norse was *Straumsey*, meaning "the island in the current." It is about two miles long and one broad, and has some 340 inhabitants. On the west and north-west coasts high cliffs occur. There are no trees existent. In an old topographical work on Scotland it is said that a dispute arose as to whether Stroma belonged to the Orkneys or to Caithness, and that it was decided in the following quaint manner. Some venomous animals (of what kind we are not told) lived in Stroma. Of these a certain number were shipped at the same time to colonise Orkney and Caithness. Those that were brought to Caithness took kindly to the soil, as to a congenial habitat; while those that were sent to Orkney, from the unfavourable effects of the climate, sickened and died. By this singular method Stroma was adjudged to belong to Caithness.

The "Swelchie" of Stroma is a very dangerous whirlpool, and a romantic origin is given for it in the "Grotta-songr" from the "Younger Edda" by Mr. R. B. Anderson.¹

For the material for this paper I am indebted to Miss A. M. Geldart of Norwich, who made a collection of plants during

¹ "History of Caithness," pp. 16-347, 1887.

the time she was on the island, about five weeks in June and July 1899.

She accompanied the Rev. W. Dundas and his wife. Mr. Dundas was a native of Stroma, and the first minister of its little church. He called Miss Geldart's attention to the fact that the vegetation in Stroma is nearly three weeks later than on the mainland coast opposite, though that coast slopes to the north (snow often lying there in winter when it does not at Stroma), and there is considerably more sunshine and less rain at Stroma than on the mainland. This seemed to agree with Miss Geldart's observation of *Thymus Serpyllum* well in flower at Duncansby (just east of John o' Groat's) on July 6, whereas the first single flower did not open at Stroma till July 21. The few plants of *Mertensia* on Stroma did not seem so forward on July 15 as those at John o' Groat's on the 6th. Miss Geldart says: "I only visited the mainland twice, so had no opportunity of continuing the comparison, but kept a record, where possible, of the opening of the *first flower* in Stroma." The dates after notices of species are from this record.

She very kindly gave me a set of the specimens gathered. These are marked with ! after the name. The other species noted are given on her authority, and may be accepted as trustworthy. She is the daughter of an able botanist.

At the end of this paper will be found a few additions, etc., to the Caithness flora that have come to hand since the last paper.¹ There are also a few "Notes" by Miss Geldart on the mainland species as observed by her.

I have left the names nearly as Miss Geldart has them in her MS.

The only species that has not been reported for Caithness seems to be *Spergularia marginata*, Syme. This is recorded for the Orkneys.

C. stands for common ; V.C. for very common.

RANUNCULUS HEDERACEUS, L.—Where a little stream is dammed up ; and "I think also in a stream on the west side near cliff."

R. FLAMMULA, L., and *var.* PSEUDO-REPTANS, Syme. !—The variety is common, but not so the type.

¹ No. 1. "Scottish Naturalist," 1888, pp. 305-357 ; 1889, p. 77.

No. 2. "Ann. Scot. Nat. Hist.," 1892, p. 247.

R. ACRIS, *L.*—C.

R. REPENS, *L.*—Marsh behind Manse, July 5.

CALTHA PALUSTRIS, *L.*—V.C. in all ditches.

FUMARIA OFFICINALIS, *L.*—V.C. among crops, July 5.

BRASSICA ARVENSIS, *Boiss.*—V.C. in crops.

CARDAMINE PRATENSIS, *L.*—C., end of June.

COCHLEARIA OFFICINALIS, *L.*—Rocky ledge among Kittiwakes' nests.
July 18, Rev. W. Dundas.

CAPESELLA BURSA-PASTORIS, *L.*—Near Stroma Manse, July 8. Does
not seem a common plant.

POLYGALA VULGARIS, *L.*, and DEPRESSA, *Wend.*—Both C.; *depressa*
very deep blue.

VIOLA RIVINIANA, *Reich.*

V. TRICOLOR, *L.*!—V.C. This is quite like the Orkney plant.

LYCHNIS DIURNA, *Sibth.*—Very luxuriant on perpendicular east cliffs;
two shades of pink. First flower, June 30.

L. FLOS-CUCULI, *L.*—Several places on east side. First flower, July
20. On west cliff a dwarf-spreading form!

STELLARIA MEDIA, *Cyr.*—C.

S. ULIGINOSA, *Murr.*—East cliff, June 30.

ARENARIA PEPLOIDES, *L.*—North-east coast, plentiful; flowering
July 15. (Mainland, Huna, flowering July 6.)

SPERGULA ARVENSIS, *L.*—V.C. in fields.

SPERGULARIA MARGINATA, *Syme.*!—South-west, July 11. Not
recorded, I think, for Caithness.

SAGINA PROCUMBENS, *L.*! and S. MARITIMA, *Don.*!

CERASTIUM TRIVIALE, *Link.*! *var.* SERPENTINI, *Syme.*—Same as the
Shetland plant so named; see "Ex. Club Rep.," 1876, p. 11.

MONTIA FONTANA, *L.*, *a* REPENS, *Pers.*!

HYPERICUM PULCHRUM, *L.*—East cliff, July 20. (Mainland, Gills,
July 24.)

RADIOLA LINOIDES, *Roth.*!—Among moss, usually with a single
stem, July 19.

LINUM CATHARTICUM, *L.*—Heath near Manse, fairly plentiful in isle.

GERANIUM DISSECTUM, *L.*—South-east cliff, only one plant seen,
July 20.

ANTHYLLIS VULNERARIA, *L.*, *var.* OVATA, *Bab.*!—C. near cliffs, end
of June. The same as the Shetland plant so named; see "Scot.
Nat.," 1888, p. 212.

TRIFOLIUM PRATENSE, *L.*—C.

T. REPENS, *L.*—C. even on the Came or Comb, rocky ridge 3 to 4 feet wide, jutting out over the sea in a gully on the north-west coast.

T. MINUS, *Relh.*—C. first week in July.

LOTUS CORNICULATUS, *L.*—V.C., the country yellow with it, June 28.

VICIA CRACCA, *L.*—C., June 30.

†VICIA SATIVA, *L.*—Sown with the oats in the fields.

V. SEPIUM, *L.*—Fields, east side, July 15. (Mainland, at John o' Groats, July 6; at Gills, July 24.)

LATHYRUS PRATENSIS, *L.*—V.C. along ditches and roadsides.

SPIRÆA ULMARIA, *L.*—C. on east cliffs, in bud, June 20.

POTENTILLA TORMENTILLA, *Schenck.*—Frequent, "with thick root-stocks."

P. ANSERINA, *L.*!—V.C., and a small form which may be the sub-var. *pusilla*, Coss. and Germ.

RUBUS SAXATILIS, *L.*—On sea-cliffs, with long runners; fruits at only one place on the east cliff; in flower July 1. One of the inhabitants who had watched it for several years told Miss Geldart that this little sheltered bay is the only place where the fruit ever turns red; perhaps the fruit forms without ripening in other situations.

The only wild rose in Stroma is a white dog-rose at the extreme edge of east cliff, among *Salix repens*; unfortunately no specimen was taken.

MYRIOPHYLLUM ALTERNIFLORUM, *DC.*!—Marsh near Manse, July 5.

CALLITRICHE was in flower west of Manse, July 23, but no fruit was found.

(*Sedum Rhodiola*, *DC.*—Though this occurs plentifully on the opposite shore of the mainland on cliffs between Huna and John o' Groat's, I could not find a single specimen in Stroma. There is one plant in a garden which was brought from Dunnet Head thirty years ago, and was flowering this year for the first time.)

PARNASSIA PALUSTRIS, *L.*!—Just beginning to flower, June 30; from 1 inch high.

HYDROCOTYLE VULGARIS, *L.*—V.C.

HELIOSCIADIUM INUNDATUM, *Koch*!—Marsh north of Manse, July 5.

LIGUSTICUM SCOTICUM, *L.*!—Top of south-west and north-west cliffs, very fine.

ANGELICA SYLVESTRIS, *L.*—Slopes of east cliff and west cliff, July 17.

HERACLEUM SPHONDYLUM, *L.*—Frequent.

CHÆROPHYLLUM SYLVESTRE, *L.*—Frequent on north-west coast, July 15. (Mainland, cliff top, Huna, July 6.)

(SAMBUCUS NIGRA, *L.*—Only in cottage gardens, as a hedge or shelter.)

GALIAM VERUM, *L.*—East cliff, in bud, June 30.

G. SAXATILE, *L.*—Common among heather and turf, June 28.

G. PALUSTRE, *L.*—Marsh behind Manse, July 5.

G. APARINE, *L.*—Sea-cliff base along shore, July 1.

SHERARDIA ARVENSIS, *L.*—South-west road, July 20. I only remember seeing one plant.

SCABIOSA SUCCISA, *L.*—V.C., July 22.

CARDUUS ARVENSIS, *Curt.*—With a white-flowered variety also.

(*Arctium Lappa?*—At John o' Groat's, close to the hotel, just above the shore. Perhaps this is the plant which formerly grew at Stroma, at the south-east corner, "with large leaves like Rhubarb," but which is now all ploughed up.) The *Arctium* at John o' Groat's is probably *A. minus*.

CHRYSANTHEMUM SEGETUM, *L.*—V.C., July 6.

MATRICARIA INODORA, *L.*—V.C., July.

M. MARITIMA, *L.*!—West cliff, on shelves of perpendicular cliff. Gull Rock, July 4.

ACHILLEA MILLEFOLIUM, *L.*—On cliff, in bud, June 30. First flower, July 20.

A. PTARMICA, *L.*—Frequent, not in flower till after July 20.

ARTEMISIA VULGARIS, *L.*—Frequent, July 21.

GNAPHALIUM DIOICUM, *L.*!—Among heath west of Manse, June 20; frequent about second week in July, but always among heather.

SENECIO VULGARIS, *L.*—Weed in fields. (Common on seashore at Huna, Mainland.)

S. AQUATICUS, *Huds.*—C., June 30.

BELLIS PERENNIS, *L.*—V.C.

ASTER TRIPOLIUM, *L.*—Frequent on perpendicular cliffs near the Gloop; not in flower till end of July or August.

TUSSILAGO FARFARA, *L.*—On roadside banks of the north road; leaves only.

HYPOCHÆRIS RADICATA, *L.*—C., July 17.

LEONTODON AUTUMNALIS, *L.*!—Flowering from middle of July. A small one-flowered form with black hairs on the phyllaries; not quite the same as the var. *pratensis*. Is not our name for this latter variety wrong? I am unable to separate some of our specimens from the var. *nigro-lanata*, *Fr.* I believe the following names all refer to the same plant, or forms of it:—
L. autumnalis, *L.*, var. *nigro-lanatus*, *Fr.*, “*Flora Hallandica*,” 1817.
L. autumnalis, *L.*, var. *alpinus*, *Meyer*, “*Ch. Hann.*,” p. 437, 1836.
L. autumnalis, *L.*, var. *pratensis*, *Koch*, “*Syn. Fl. Germ. et Helv.*,” ed. 2, p. 480, 1844.

TARAXACUM OFFICINALE, *Wigg.*—Not common.

SONCHUS OLERACEUS, *L.*—South beach, in bud, July 4.

S. ASPER, *Hoffm.*—Frequent on top of east and south cliffs.

ERICA TETRALIX, *L.*—A few specimens on east side, mostly in bud, June 30. In flower on west side in July.

E. CINEREA, *L.*—Not frequent, having been used for fuel; July 16 in flower—purple, rose-pink, and white.

E. VULGARIS, *L.*—Flowering in end of July.

EUPHRASIA LATIFOLIA, *Pursh.*!

VERONICA AGRESTIS, *L.*—July 20. I only remember seeing one plant.

PEDICULARIS SYLVATICA, *L.*—Frequent.

RHINANTHUS CRISTA-GALLI, *L.*!—V.C., with small flowers.

THYMUS SERPYLLUM, *Fr.*—July 21. (Plentiful at Duncansbay Head, Mainland, in flower, July 6.)

PRUNELLA VULGARIS, *L.*—On heath on east side, with last year's seed-stalk; no flowers on June 30. Fairly common.

GALEOPSIS TETRAHIT, *L.*—Frequent.

LAMIUM PURPUREUM, *L.*—A weed in fields.

MERTENSIA MARITIMA, *Don.*—A few plants on north-east coast, July 15. (Plentiful in shell-sand along shore between Huna and John o' Groat's, on Mainland, July 6.)

LYCOPSIS ARVENSIS, *L.*—C., June 28.

PINGUICULA VULGARIS, *L.*—V.C. at east cliff; hundreds in flower June 29; one patch of *Primula scotica* growing among it.

PRIMULA VULGARIS, *L.*—At east cliff, still in flower, June 29; called by the Stroma people “the May Flower.”¹

P. SCOTICA, *Hook.*!—In two localities at east cliff; a few in seed on July 1, and three specimens in flower. I afterwards discovered a third patch close to the path between the Manse and the

¹ This name is given to it commonly in Orkney also.—J. W. H. T.

marsh to the north of it. I was told this patch was not there twenty years ago. It is decidedly increasing in the island, but is entirely confined to the three straggling patches; not a single specimen anywhere else. Altogether I must have seen a thousand plants, but many were small, like young seedlings, and did not look like flowering this year. In full flower about the middle to end of July.¹ Scapes from $1\frac{3}{4}$ to $4\frac{1}{2}$ inches.

GLAUX MARITIMA, *L.*—Plentiful at north and south-west of island.

ARMERIA MARITIMA, *Willd.*—V.C. near cliffs; dark and pale pink and white flowers.

MYOSOTIS CÆSPITOSA, *Schultz*!—East side.

M. VERSICOLOR, *Reich.*, var. !—South-west of the island. This is a variety of *versicolor* with much the aspect of the Continental *M. stricta*; it seems an analogous form to the *M. arvensis*, var. *stricta*, of Holland. I can find no specimens or name that exactly fit it, and would call it f. *stricta* (ad int.).

ATRIPLEX, *sp.*—Is probably *A. Babingtonii*, Woods, var. *virescens*, Lange; or possibly it may be *A. calotheca*, Fr.; but the specimen is too young for certain determination.

PLANTAGO MARITIMA, *L.*—By sea, and inland in flower June 29.

Var. MINOR, *Hook.*²

Var. HIRSUTA, *Syme.*—Frequent on cliffs.

P. MAJOR, *L.*—Road weed.

P. CORONOPUS, *L.*—On cliffs west of Manse, June 28.

LITTORELLA LACUSTRIS, *L.*—Frequent on damp heath near Manse, June 20; and in the north-west.

RUMEX ACETOSA, *L.*—C.

R. ACETOSELLA, *L.*—V.C.

POLYGONUM AVICULARE, *L.*—In flower, July 11; no seed found.

EMPETRUM NIGRUM, *L.*—V.C. Flower, June 28. Fruit ripe fourth week in July.

EUPHORBIA HELIOSCOPIA, *L.*—East cliff, July 20. It was sent to me by a woman "as good for warts."

URTICA DIOICA, *L.*—In thick clumps, but not very common.

SALIX REPENS, *L.*!—At edge of south-east cliff, creeping in grass, and only appearing 3 inches high. Ground white with seed, June 30; not seen elsewhere.

POTAMOGETON NATANS, *L.*!

¹ See Mr. Grant on its flowering, "Science Gossip," 1881, p. 20.

² See "Exchange Club Report" for 1886, p. 157 (1887); "Scot. Nat.," 1888, p. 214.

P. POLYGONIFOLIUS, *Pour.* !—Marsh behind Manse, July 5.

Here we have the two species growing under the same conditions : *polygonifolius* is in good fruit, and is typical of the smaller states of it ; *natans* is in flower—the whole plant typical of the Linnean Herbarium specimen, except that the leaves are rather narrower in the Stroma plant.—A. B.

TRIGLOCHIN PALUSTRE, *L.* !—V.C., thousands, from 4 to 6 inches high.

T. MARITIMUM, *L.*—Near the Little Gloop, July 4, but not common.

ORCHIS MACULATA, *L.* !—V.C., white and purple.

HABENARIA VIRIDIS, *Brown.*—East cliff, July 10. Small, and very difficult to see, in grass near Manse, with *Botrychium*. At the end of July most of it was only beginning to come up, the flower heads only appearing half an inch from the ground (to top of spike) and leaves either not showing or hidden by the short grass.

IRIS PSEUDACORUS, *L.*—In ditch south-east, flowering June 30 and later ; frequent.

SCILLA VERNA, *Huds.* !—Dozens of it in flower, June 28, near top of cliff west of Manse. Extremely common on cliffs at east and west sides.

NARTHECIUM OSSIFRAGUM, *Huds.*—July 22, east cliff. I only saw this one small patch in the island ; but perhaps I was rather too early for it—I left Stroma on August 2.

LUZULA CAMPESTRIS !—Frequent.

JUNCUS BUFONIUS, *L.*—West of Manse.

J. SUPINUS, *Mench.* !

J. CONGLOMERATUS, *L.* !

J. GERARDI, *Lois.* ! North-east rocky shore, July 15.

J. SQUARROSUS, *L.* !—C. in heather near Manse, bud June 30.

SCHÆNUS NIGRICANS, *L.* !—One small patch in ditch, top of cliff north of Manse.

SCIRPUS SETACEUS, *L.*—A few strong clumps in ditch west of Manse, July 5.

S. PAUCIFLORUS, *Light.* !—July 5.

S. PALUSTRIS, *L.* !—July 5.

S. UNIGLUMIS, *Link.* !—July 4.

S. CÆSPITOSUS, *L.* !—June 29.

ERIOPHORUM ANGUSTIFOLIUM? *Roth.*—Common in damp places, June 29.

- CAREX PULICARIS, *L.* !—Damp heath with *Erica Tetralix* and near *Primula scotica*, east side.
- C. ECHINATA, *Murr.* !—Fruiting on July 5.
- C. FLACCA, *Schreb.* !—In large gray patches, frequent in flower from middle of July.
- C. GOODENOVII, *Gay*, var. JUNCCELLA !—In water in marsh, July 5.
- C. BINERVIS, *Sm.* !—July 1.
- C. FLAVA, *L.*, var. MINOR, *Towns.* !
- C. FLAVA, *L.*, *f.* !
- C. PANICEA, *L.* !—June 29, in fruit.
- ANTHOXANTHUM ODORATUM, *L.*—V.C.
- AGROSTIS PUMILA *L.*
- DIGRAPHIS ARUNDINACEA, *Trin.*—On cliff slope, south-east, July 20.
- ALOPECURUS GENICULATUS, *L.*—V.C.
- A. PRATENSIS, *L.*—Slope of south-east cliff, among *Iris*, July 1.
- AIRA CÆSPITOSA, *L.* !—Large clumps at edge of east cliff, in flower, July 20. North of Manse, in flower, June 28 ; form approaching var. *brevifolia*.
- A. PRÆCOX, *L.* !—June 20 ; $\frac{3}{4}$ to 4 inches high.
- ARRHENATHERUM AVENACEUM, *Beauv.*—East cliff, July 1. Common along north-east, beginning to flower, July 15.
- TRIODIA DECUMBENS, *Beauv.*—East cliff, several plants, but generally solitary, July 1.
- MOLINIA VARIA, *Schrank*, var. DEPAUPERATA, *Bab.* (sub *M. cærulea*, *Möench*) !
- AVENA PUBESCENS, *L.* !—July 2.
- GLYCERIA FLUITANS, *R. Br.*—In many ditches.
- POA PRATENSIS, *L.* !—July 2.
(There is no note of *P. annua* being seen.)
- CYNOSURUS CRISTATUS, *L.*—V.C. July.
- DACTYLIS GLOMERATA, *L.*—At Beach Harbour, near graveyard, June 30.
- FESTUCA OVINA, *L.*—June 30. I brought only one specimen, but I think it was fairly common.
- F. RUBRA, *L.* !—July 4.
- TRITICUM REPENS, *L.* !—North-east shore, July 15.
- LOLIUM PERENNE, *L.*—Extremely common ; and sown for hay.

NARDUS STRICTA, *L.*—Plentiful near the Manse.

PTERIS AQUILINA, *L.*—Edge of cliff, south-east, 6 inches high, June 30.

ASPLENIUM MARINUM, *L.*—East and north cliffs, but not very frequent.

BOTRYCHIUM LUNARIA, *Sw.*!—Close to the Manse, in bud, July 1.

SELAGINELLA SELAGINOIDES, *Gray*!—Heath near east cliff, very small, July 3. I did not notice it anywhere else.

EQUISETUM PALUSTRE, *L.*

Of these, the only ones that I believe are not recorded for the Orkneys are: *Ranunculus Flammula*, var. *pseudo-reptans*; *Euphrasia latifolia*; *Atriplex Babingtonii*, var. *virescens*; *Carex Goodenovii*, var. *juncella*.

The following species were gathered on the mainland (on the cliffs or shore) opposite Stroma, from John o' Groat's to Gills; though of them Miss Geldart could not find a trace in Stroma:—

RANUNCULUS FICARIA, *L.*—By the mill-stream at John o' Groat's.

GERANIUM MOLLE, *L.*

ULEX, *sp.*—Not in flower.

ALCHEMILLA VULGARIS.—One plant at Gills, July 24.

ROSA SPINOSISSIMA, *L.*

EPILOBIUM MONTANUM?

SEDUM RHODIOLA, *DC.*

LONICERA PERICLYMENUM, *L.*—By mill-stream at John o' Groat's; not yet in flower on July 6.

SOLIDAGO VIRGA-AUREA, *L.*—6 inches high, on Huna cliff, July 6.

HIERACIUM PILOSELLA, *L.*—Huna cliff.

VACCINIUM MYRTILLUS, *L.*—By mill-stream, John o' Groat's.

VERONICA SERPYLLIFOLIA, *L.*—Shore at Huna.

LUZULA SYLVATICA, *Beck.*—Frequent at Huna.

ELYMUS ARENARIUS, *L.*—Planted or wild?

BLECHNUM SPICANT.

ASPLENIUM FILIX-FEMINA, *Bernh.*

ASPIDIUM DILATATUM.

POLYPODIUM VULGARE, *L.*

Additions, etc., to No. 2 of 'Contributions towards a Flora of Caithness' ("Ann. Scot. Nat. Hist.," October 1892):—

CAKILE MARITIMA, Scop.—Formerly in Sinclair Bay, but in a great storm became deeply covered with sand. Grant, "Northern Ensign," 31st January 1884.

COCHLEARIA GREENLANDICA, L.—South of Wick. Marshall, "Journal of Botany," 1894, p. 114.

HYPERICUM QUADRANGULUM, L.—Dirlot, R. Dick.

[*Stellaria aquatica*, Scop., or *S. nemorum*, L.?—By the Thurso River, R. Dick.]

ROSA CANINA, L., var. BISERRATA, Mérat.—Banks of the Isauld Burn, W. F. Miller!

R. CANINA, L., var. BAKERI, Déség.—Bank above the river near Thurso, W. A. Shoolbred! 1893.

PYRUS MALUS, L.—Westfield, R. Dick.

HIERACIUM DISSIMILE, Lindeb., var. POLLIENUM, Dahlst.—Strath Burn at Wick, W. W. Reeves; "Journal of Botany," 1894, p. 230.

H. FRIESII, Hartm.—Bank above river at Thurso, W. A. Shoolbred, specimen.

H. OREADES, Fr.—The Berriedale plant is referred by Mr. Hanbury to var. SUBGLABRATUM; "Journal of Botany," 1894, p. 227.

EUPHRASIA FOULENSIS, Towns.—Cliffs at Downreay, July 1888, Fox and Hanbury!

E. LATIFOLIA, Pursh.—Thurso, Marshall, "Journal of Botany," 1898, p. 274!

E. FOULENSIS × LATIFOLIA?—Cliffs at Downreay, July 1888, Fox and Hanbury; "Journal of Botany," 1898, p. 150.

[*Melampyrum sylvaticum*, L.—Error of place, and doubtless of station too.]

HIPPOPHAË RHAMNOIDES, L.—Reay. This was planted; and Dr. Davidson was quite correct as to the plant.

POTAMOGETON FILIFORMIS, Volte.—Ditch beside "Old Man of Wick," R. Kidston, specimen, 1893.

ORCHIS MACULATA, L.—A specimen, showing regular peloria of the perianth, was found by Miss Munro of Alness; "Trans. Bot. Soc. Edin.," November 1894.

CAREX KATTEGATENSIS, *Fr.*—Bank of the Thurso River, July 1875, G. Horn, in Herb. Syme.!

This has not been reported for the Thurso River; only for the Wick River. Could Mr. Horn have mixed his specimens?

C. AQUATILIS \times KATTEGATENSIS, *Fr.* = *C. Grantii*, *Ar. Benn.*—Wick River; F. J. Hanbury in Herb. Bennett; "Journal of Botany," 1897, p. 250.

C. CAPILLARIS, *L.*—Moss, Holborn Head, Reeves and Ward, specimen.

ATHYRIUM F.-FEMINA, *var. MOLLE*, *Roth.*—Dunnet Head, R. Dick.

[?*Lycopodium inundatum*, *L.*—By implication, Robert Dick would seem to have found this in the county; see Smiles, "Life of Robert Dick," p. 296.]

CHARA VULGARIS, *L.*, *var. MELANOPYRENA*, *H. and J. Groves.*—Mossy ditch, Ben Dorrery, August 1880, Dr. Davidson!

ZOOLOGICAL NOTES.

The Weasel in Jura.—On 30th October 1895 I noticed a Weasel (*Mustela vulgaris*) on the sill of a window near which I sat writing. I had a good view, within a few feet, of the little creature's deliberate retirement, tail towards me. On inquiry in Jura I found that a man I have known well for about twenty years, and employed as a yacht-hand, had taken a Jura Weasel in 1892 while trapping rabbits. The year is impressed on his memory because it was the first winter he worked in Jura. He knows the Weasel well from experience on the mainland.

He has been trapping rabbits in Jura each winter since 1892, and during the past season he saw two Weasels, and at once baited a trap on or about 24th December 1899. On 1st January 1900 Miss Isabella Campbell, for whom he was trapping, sent him up to me with a fresh-caught Weasel. He has not been able, so far, to secure another—or the other. The captured specimen is now in the Cambridge Museum of Zoology. The traps are set solely for rabbits, but Stoats have sometimes strayed into them, and in 1892 a Weasel did so. My impression is that Weasels are pretty rare in Jura, though my man tells me that he saw two in 1897. Stoats, on the other hand, are fairly common there. Mr. Martin of Dunlossit, Islay, has promised to keep a look-out for Weasels in Islay; he is quite familiar with them, and his home gamekeeper knows them also.—H. EVANS, Jura Forest.

Badgers in the Lothians.—In connection with the future distribution of *Meles taxus* in the Lothians, it may be interesting to

note that at the beginning of the present year, by order of the Earl of Rosebery, two badgers, male and female, were turned down on the Rosebery Estate, Gorebridge. The Badger colony in Dalmeny Park, which dates from 1889, still flourishes, and Badgers' earths are now to be found in Hopetoun and other estates to the westward.—CHAS. CAMPBELL, Dalmeny Park.

Ornithological Notes from "Solway."—In the last "Annals" (p. 48) I recorded the occurrence of a Great Gray Shrike (*Lanius excubitor*). Another specimen, making the second for the winter, was shot near Maxwelltown on 17th February during the big snow-storm. The former individual was one of the double-spotted form, while this one is a typical example of the single-spotted bird. There has been an extraordinary immigration of Wild Swans all over the area, no fewer than forty Whoopers (*Cygnus musicus*) having frequented the Blackshaw Bank at the head of the Solway in the early part of December. Smaller parties, some of them being undoubtedly Bewick's Swans (*C. bewicki*), were seen then at other places, and during the rest of the winter. A herd of twenty-five was reported as seen on a loch in Wigtownshire in early February. I heard of a lot of six being seen at the mouth of the Nith on 2nd March. The Sheldrakes have remained on the Solway during the entire winter in larger numbers than have been noted before, so far as my experience goes. On 4th January I saw many hundreds of them along the shore to the west of Southernness. On the same date I fell in with Sanderlings (*Calidris arenaria*), and a friend shooting on same day at some miles distance shot a pair of these birds. I do not remember ever seeing these birds with us at mid-winter before, but others have been more fortunate. A very interesting fact that has come under my notice has been the astonishingly large proportion of birds of the year amongst the ducks of several species frequenting fresh waters. The only rarity amongst the Anatidæ I have met with is a Gadwall (*Anas strepera*) taken on the Solway on 3rd February. It is a fine female. I think this is the first record of the species in "Solway." A rather tragic incident in bird behaviour was witnessed by me during the hard weather in February. Large parties of Gulls of the Black-headed and Common species were sitting about the frozen surface of the Nith at Dumfries. A pair of Pied Wagtails (*Motacilla lugubris*) were tripping about amongst them at one particular spot. Suddenly a Black-headed Gull (*Larus ridibundus*), a bird of the year, darted at one of the W gtails, seized it in its bill, and proceeded to batter it to death. Some of the other gulls tried to get the morsel from the captor, but without success. After a while it devoured it at leisure. This murder seemed to be the direct result of excessive hunger. A fine specimen of the Red-necked Grebe (*Podiceps griseigena*) was shot at Portmarty on 20th February, and has been added to the collection

in the Kirkcudbright Museum. This completes my notes of the winter, so far as they contain anything of importance.—ROBERT SERVICE, Maxwelltown.

Black Redstart at Aberdeen.—On the 20th of March last a male specimen of the Black Redstart (*Ruticilla titys*) flew into, and was caught in, a house in Aberdeen, and is now in my possession. This is the first record for the species in Aberdeenshire, so far as I am aware.—GEO. SIM, Aberdeen.

Blackcap in Perthshire in December.—I record what I believe to be the unusual appearance of the Blackcap (*Sylvia atricapilla*), a female, during December last at the Manse of Kinfauns. The bird has been with us four days now (the 21st), coming regularly with other birds to be fed at our window. She is very vigorous—in fact, she drives off the other birds. We have the Blackcap here occasionally in summer, but I never heard of an instance of its occurrence so far north in winter.—RODGER G. DAVIDSON, Kinfauns.

Chiff-chaff in Barra.—A specimen of the Chiff-chaff (*Phylloscopus rufus*) was shot on the island of Barra, Outer Hebrides, on the 18th of November 1899; and another example, which accompanied it, was secured two days afterwards, when at roost in a whin. This species is new to the avifauna of the island. Mr. Eagle Clarke has seen one of the specimens, which I have presented to the Edinburgh Museum of Science and Art, and he has kindly confirmed my identification of the species.—W. L. MACGILLIVRAY, Barra.

[The Chiff-chaff has hitherto been very doubtfully recorded for the Outer Hebrides.—EDS.]

Long-eared Owl in Barra.—A fine example of the Long-eared Owl (*Asio otus*)—a bird new to the fauna of Barra—visited us after a strong S.W. wind on the 28th of October last, and was observed in a willow plantation on the west side of the island.—W. L. MACGILLIVRAY, Barra.

[This species was only doubtfully included for the region in the "Fauna of the Outer Hebrides," 1888; but it was recorded for North Uist, where a specimen was obtained in January 1897, in the "Annals," 1898, p. 50.—EDS.]

Tameness of Herons.—For some winters past a Heron (*Ardea cinerea*) has come regularly close to the house here, to where some poultry are fed, often mixing with them, and taking scraps of meat, etc., when thrown to him a short distance away. This winter he has brought a second Heron with him, apparently a younger bird, which is tame, as he usually comes to the food when thrown to him without any fear. One day lately I noticed the old Heron taking a siesta on the topmost lump of a temporary coal-heap. They are rather omnivorous in their tastes, but have a distinct pre-

ference for cooked food to anything else, unless perhaps a dead mouse, which they take with avidity. I have not heard before of Herons so tame, but perhaps some of your readers may have had a like experience. The Common Moor or Water Hens (*Gallinula chloropus*) have also been very tame this winter, mixing and feeding with the poultry, and taking kindly to oats, which perhaps may be an acquired taste.—A. ELLIOT, Caverton, Roxburgh.

Bitterns in Stirlingshire.—During the severe weather towards the end of December last, several Bitterns (*Botaurus stellaris*) were seen, and one shot, on the Carron near Denny.—J. A. HARVIE-BROWN.

The Bittern in Ayrshire.—Although Messrs. Gray and Anderson stated that the Bittern (*Botaurus stellaris*) was “of very rare and uncertain occurrence” in Ayrshire (“Proc. Nat. Hist. Soc. Glasgow,” i. p. 303), during the past decade I have learned of the occurrence of seven examples in that county, all so far unrecorded in scientific journals, I believe. Two were shot in 1890 at Dalmellington, and one at Doonfoot in 1891, as I was informed some years ago by Mr. W. C. S. Fergusson, Ayr. Another, which had been killed at Doonfoot “recently,” was exhibited to the Andersonian Naturalists’ Society on 1st November 1893. Mr. Charles Berry has one in his collection, which he shot near Lendalfoot in January 1890 or 1891, I think. Mr. Matthew Barr has kindly sent me word of a pair (♀ and ♂), shot near Ayr early in January this year, which had been sent for exhibition by a taxidermist in Kilmarnock to the meeting of the Glenfield Ramblers’ Society, Kilmarnock, on 23rd January.—JOHN PATERSON, Glasgow.

Bittern in Nairn.—A Bittern was seen on 10th January 1900, about four miles above the mouth of the river Nairn, by Mr. H. E. Pope. It was standing in the river bed, which at that point is rather broad, among some dead branches and rubbish.—T. E. BUCKLEY, Inverness.

Gray Geese on the Solway Firth.—The Gray Lag and White-fronted Geese (*Anser ferus* and *A. albifrons*) are comparatively rare visitors to the salt marshes of the Solway Firth; but only experts can be expected to identify *young* specimens of our Gray Geese. A specimen of *Anser albifrons*, which, being immature, was first reported to me as a Gray Lag, was shot on one of the marshes on 30th January 1898. I do not think that I have recorded it previously. But on 22nd December 1899 two undoubted Gray Lag Geese, young birds, were shot near Sillloth, out of a gaggle of five birds. They had the following soft parts:—upper mandible, pinky flesh-colour; unguis, white tinged with dusky; legs and toes, orange yellow, with white claws. I had one of them mounted for the Carlisle Museum, which previously possessed only one specimen, and that a fine adult.—H. A. MACPHERSON, Pitlochry.

Pintails at Edenmouth.—In the first week of January 1900 a poulterer in Morningside, Edinburgh, in whose shop I saw them, received no less than eight Pintails (*Dafila acuta*) from the estuary of the Eden near St. Andrews. They were all females and young males. I fear some of them at least would be Loch Leven birds, for there was much ice on the loch in the end of December. The number of pairs breeding on Loch Leven last year seems by all accounts to have been larger than when I discovered the colony there two years ago ("Annals," 1898, p. 162); but between indiscriminate eggging—which, there is reason to believe, was as great as ever last year—and shore shooting, the rate of increase must be very slow.—WILLIAM EVANS, Edinburgh.

Iceland Gull in Bute.—Through the kindness of Mr. McCulloch, taxidermist, Glasgow, I had the pleasure of exhibiting, to the Andersonian Naturalists' Society, on 12th January, an Iceland Gull (*Larus leucopterus*, Faber) in the flesh, which had been received on that date from Port-Bannatyne, Bute.—JOHN PATERSON, Glasgow.

Little Auk at Portobello.—A young female specimen of the Little Auk (*Mergulus alle*) was captured in the clay-pits on the south side of the railway between Portobello and Piershill Stations, on 20th November 1899.—WM. S. BRUCE, Joppa.

Little Auk at Corstorphine.—A young female specimen of the Little Auk (*Mergulus alle*) was found on the railway to the west of Corstorphine Station on 1st March 1900. It was seen to fly against the telegraph wires, and, thus injuring itself, was captured.—T. N. JOHNSTON, Corstorphine.

The Little Auk on Dalmeny Shores.—For the first time since the memorable winter of 1894-95, the Little Auk (*Mergulus alle*) has made its appearance here. On the 22nd of February a living one was picked up some little distance inland, and the next day a dead one was found on the shore. The weather at this time was very stormy, with gales mostly from the north-east.—CHAS. CAMPBELL, Dalmeny Park.

[About the same time two were obtained at Portobello, as we are informed by Mr. W. A. Nicholson of that town, and since we went to press Mr. Campbell has informed us of six other specimens having been washed up at Dalmeny and Granton.—EDS.]

Little Auk on the Solway Firth.—The only specimen of *Mergulus alle* that has, to my knowledge, been obtained on the Solway Firth this winter was shot near Sillioth on 5th February. I purchased it for the Carlisle Museum.—H. A. MACPHERSON, Pitlochry.

The Dog-fishes of the "Clyde" Waters, and a Correction.—As my name is mentioned in connection with the record of this fish for the Clyde, published in the January number of this magazine, it may be of interest to give the results of some inquiries I have made

concerning this capture. It is not necessary for me to explain why, at first, I accepted the record, which was based on a communication to the "North British Daily Mail," as genuine, nor why I afterwards was led to think that a mistake as to the species may have been made. It will suffice if I say that I now find that the name *S. catulus* has probably, through some inadvertence, been applied to another species than the Larger Spotted Dog-fish.

Specimens of a Dog-fish known as the Tope or Toper (*Galeus canis*) have been occasionally landed at Girvan during the winter, and it is very likely that the name *S. catulus* in the "Daily Mail" paragraph refers to specimens of this fish. At any rate, I have been unable so far to obtain any satisfactory information regarding the occurrence of the Larger Spotted Dog-fish, or Nurse-hound (*Scyllium catulus*), in the Clyde estuary.

The Lesser Spotted Dog-fish, or Rough-hound (*Scyllium caniculus*), is occasionally taken in the Clyde in the trawl of the Fishery steamer "Garland," but the other has not yet been observed. Moreover, the Larger Spotted Dog-fish is also absent from the list of fishes captured by the SS. "Medusa," which belonged to Dr. (now Sir) John Murray, which was so successful in its investigations into the Fish and Invertebrate Fauna of the Clyde.

It is possible, however, notwithstanding this negative evidence, that *Scyllium catulus* may be, though rare, a member of the Clyde fauna; and as it bears a close resemblance to the more common species and might be mistaken for it, a reference to one of the more obvious differences between them may be of interest to those who are not so familiar with these fishes.

There are three kinds of Dog-fishes in Scottish waters which have their skin ornamented with spots. First we have the Black-mouthed Dog-fish (*Pristurus melanostomus*), readily distinguished from the others by having the *inside of the mouth of a black colour*, hence its name. The other two, as I have said, are in some respects pretty much alike, but may be distinguished by observing the outline assumed by the posterior position of the ventral fins when they are pressed together. If the ventral fins of the Lesser Spotted Dog-fish (*Scyllium caniculus*) be pressed together so that the inner edge of the one touches the inner edge of the other, their extremities will together form a moderately sharp angle, and the posterior part of the outer margins will slope away forwards and outwards. If the same thing is done with the ventral fins of the Larger Spotted Dog-fish (*Scyllium catulus*), a very slight angle is to be observed, but the lower edges of the fins form a nearly straight line athwart the fish, and if they slope they do so only to a small extent. This difference is fairly constant and reliable, whereas the difference in the size of the spots, notwithstanding the names, is not always to be depended on.—T. SCOTT, Aberdeen.

***Sepiola rondeleti* (Leach) in the Firth of Forth.**—Professor Duns, New College, Edinburgh, permits me to record a specimen of the above Cuttlefish in his museum. He himself captured the animal in a rock-pool at North Berwick a few years ago.—ROBERT GODFREY, Edinburgh.

***Limnæa stagnalis* in West Lothian.**—This conspicuous freshwater shell occurs somewhat abundantly in an artificial pond or tank near Bo'ness, where I first found it last autumn. I have shown specimens from the pond to Mr. William Evans.—ROBERT GODFREY, Edinburgh.

***Carabus monilis*, *F.*, in Scotland.**—With reference to my note in the January "Annals" (p. 53) on the occurrence of this species in "Clyde," I find that it is included in a list of Coleoptera collected on the island of Arran in 1892 by Mr. A. B. Watson, published by Mr. T. R. Billups in the "Entomologist" (vol. xxvi., 1893, p. 54). To complete the Scottish record of the species, I add another which escaped my notice at the time of writing the first note, viz. "occasionally near Edinburgh," Stephen's "Manual" (1839).—ANDERSON FERGUSON, Glasgow.

Death's-head Moth at Inverbroom, West Ross-shire.—On 15th June 1899, a specimen of *Acherontia atropos* was sent to me in London, and it looked as if it was fresh out of the chrysalis. During my twenty years' residence at Loch Broom I have never before seen a specimen of this moth, though I have always been on the look-out for it, having been very familiar with its appearance in England in my youth.—ALICE FOWLER, Inverbroom.

***Agrion puella* (L.) in Scotland.**—In his recently published book on the British Dragon-flies, Mr. W. J. Lucas writes as follows regarding the distribution of this form:—"Undoubtedly *A. puella* is a very common species in most parts of England, but apparently it does not occur in Scotland, and perhaps not in the extreme north of England." I am able, however, to state that it does occur in Scotland, for I have an example taken by myself on 22nd June 1896 at a small pond near Rosslyn in the county of Edinburgh. There were several flying about at the time. Mr. K. J. Morton has kindly examined the specimen, and confirms my identification. In Dr. Hagen's 'Synopsis of the British Dragon-flies' ("Entomologist's Annual" for 1857), the distribution of *A. puella* is set down as "England, Scotland, Ireland." The name *Libellula puella* appears in Stewart's "List of Edinburgh Insects" (1809), and also in Don's Forfarshire list (1813); but these early records are practically of no value, as several forms—among them our common *Agrion* (*Enallagma*) *cyathigerum*—would at that time be covered by this name.—WILLIAM EVANS, Edinburgh.

On the recurrence of *Upogebia deltäura*, Leach, in the Moray Firth.—An apparently full-grown specimen of *Upogebia deltäura* was taken from the stomach of a Haddock captured at Station VII., Moray Firth, *i.e.* a few miles south-eastward of Tarbetness. The specimen was obtained by Mr. F. G. Pearcey, naturalist on board the Fishery steamer "Garland," on the 12th of February last, and forwarded to the Laboratory at Bay of Nigg, Aberdeen. The specimen was considerably damaged from the treatment it had received through the teeth of its captor; happily, however, some of the more important appendages of the Crustacean—such as the claws (chelipeds), trunk-legs, uropods, and telson—were more or less intact. As the *Upogebia* are not, like the shore-crabs, found every day, they are necessarily scarcely so well known, and I was therefore at first somewhat at a loss what to make of the specimen. In his "British Stalk-eyed Crustacea," Professor Bell uses the name *Gebia* for the two British species, but Mr. Stebbing points out that *Upogebia* has priority. Those who wish for further information on this point should consult "A History of Recent Crustacea," by Rev. T. R. R. Stebbing (International Scientific Series, vol. xxiv.). *Upogebia deltäura* and *Upogebia stellata* were found for the first time in Scottish waters by Thomas Edward of Banff, and I am not aware of either of them having been found since; the present record is therefore the more interesting. There seems to be some doubt as to whether *Upogebia deltäura* and *Upogebia stellata* are really distinct. The most important difference between them is in the form of the *inner uropods*. In the former the inner uropods are "truncated and deltoid," or shaped somewhat like an equilateral triangle; while in the latter they are "subacuminate," that is, the outer distal angle of these appendages is distinctly more produced than the inner angle. There appear to be other slight differences, but the two forms are apparently very closely related. The length of the specimen now recorded is approximately about 2 inches.—T. SCOTT, Aberdeen.

On the occurrence of *Macropsis slabberi* (V. Ben.) in the Moray Firth.—This somewhat remarkable Schizopod has been obtained in some tow-net gatherings recently collected in the Moray Firth. Its occurrence there extends the British distribution of the species considerably northward. *Macropsis slabberi* is readily distinguished from all other British Schizopods by its remarkably elongated eyestalks and slender form. When living and swimming, this little Crustacean is almost transparent, and, but for its large, intensely black eyes, is nearly invisible to the unpractised eye of the onlooker. When killed by being immersed in spirit, the creature becomes whitish in colour, but the eyes still retain their intense blackness. I have obtained *Macropsis* in the Firth of Forth, where it was first discovered as British by Dr. Henderson (now of Calcutta),

and where it is sometimes common. I have also found it in St. Andrews Bay, in the estuary of the Tay below Dundee, and also taken it in the Humber to the east of Grimsby. Mr. G. C. Bourne has recorded it from Falmouth. The specimens now recorded were obtained in the Cromarty Firth, between Invergordon and Cromarty, on 17th January, and again on 5th February, of the present year; and it was also captured off the Nairnshire coast on 7th February. There is, so far as I know, no previous record of *Macropsis* from the Moray Firth.—T. SCOTT, Aberdeen.

Scottish Myriapoda.—In the course of the last three or four years I have on many occasions observed the little white Myriapod *Scolopendrella immaculata*, Newp., under stones in this district. The following are a few of the localities and dates, namely:—Arthur's Seat, February 1896 and October 1899; Charlestown, Fife, February 1896; Dregghorn, March 1896; and near Rosslyn, March 1899. It does not seem to be mentioned in Sir T. D. Gibson-Carmichael's list of Scottish Myriapoda published in the "Proceedings of the Royal Physical Society" for 1882 (vol. vii. p. 193). I have also specimens of the following species from this neighbourhood:—

Linotania crassipes, Koch.—An example of this luminous centipede was captured in Dalmeny Park, Linlithgowshire, in October 1895, by Mr. Charles Campbell, and kindly given to me. Mr. Campbell states that he got another in the same locality about 10 P.M. on 24th January of the present year. Mr. R. I. Pocock, of the British Museum, writes me that this is probably the *Scolioplanes acuminatus* of the list above referred to.

Craspedosoma rawlinsii, Leach.—Two examples of this species, first described by Dr. Leach from the neighbourhood of Edinburgh, were found by me near The Bush, a few miles south of Edinburgh, on 23rd October 1893.

An exotic *Paradesmus*—but whether *P. gracilis*, Koch, or *P. coarctatus*, Sauss., is uncertain, as the specimen is an immature ♀—was obtained in a greenhouse at Morningside in December 1898.

My best thanks are due to Mr. Pocock for having named these and some other Myriapods for me.—WILLIAM EVANS, Edinburgh.

BOTANICAL NOTES AND NEWS.

What is the Blue Lupine naturalised in Scotland?—For a number of years a showy lupine has been known to botanists, both residents and visitors, as well established on the Dee, the Beaully, and the Tay; and it was thought to be *Lupinus perennis*, L., and was recorded occasionally under that name without suspicion. It

was admitted as a naturalised plant under that name in the ninth edition of the "London Catalogue of British Plants." In January of this year Mr. James Groves asked me to compare our Scotch plant with authentic examples of *L. perennis*, L., in the herbarium of the British Museum, as he was not satisfied with the identification. On doing so, I agreed with him that our plant was not *perennis*; and an examination of the Lupines in the Kew Herbarium a few days later proved that it was undoubtedly *L. Nootkatensis*, Donn (in Sims' "Botanical Magazine," pl. 1311). All the examples that I have seen either growing or collected in Scotland belong to the one species. I was interested to find in the Kew Herbarium two specimens contributed by the Rev. M. J. Berkeley, (rather imperfect but easily recognisable,) the earliest from Scotland that I have seen. Of these one was labelled "*L. polyphyllus*?" Naturalised on the banks of the Dee near Aboyne, Aug. 1862; the other bore "*Lupinus littoralis*, Doug. Rocks in the river Dee, near Dinnet, Aberdeenshire; from seed raised by the Rev. M. J. Berkeley, July 1871." It has thus been well established beside the Dee near Aboyne for nearly forty years at least. In January 1893, in a note in this journal, I called attention to its prevalence in Scotland, under the name *L. perennis*, L., as I then believed it to be. I am glad now to be able to correct this error.

In that note some observations were recorded of the action of the lupine in changing the bed of the Dee and in diminishing the growth of alpine plants along the lower course of the stream. During the past eight years these results have been very evident; but a further change has followed. The lupines raise the beds of shingle and water-borne sand and soil above the reach of all except the highest floods in winter; but their success leads to their undoing. Grasses such as False Oatgrass, Couch Grass, etc., and other coarse native perennials, take a firmer hold year by year of the ground so gained, and the lupine tends to be crushed out. The great beds of it are no longer seen where they were so conspicuous about 1890, and it is driven to new shingle beds and to the margins still liable to be covered every winter by a moderate rise of the water.—JAMES W. H. TRAIL.

"*Mimulus luteus*, Linn.," of British Floras.—This is another native of Western North America that must be known to us in future by a different name. Professor Edward L. Greene has made us aware of the confusion that long existed as to the identity of *M. luteus*, L., the name having been given by him to a plant brought from temperate South America, and figured by Père Feuillée as a new species of *Gratiola* in 1714. This plant was not introduced into European gardens until more than a century later. Soon after 1800 the *Mimulus* now so well known and widely naturalised with us was introduced into European cultivation from the N.W.

coast of North America. It was regarded by most botanists that had grown it as distinct from *M. luteus*, L.; but the earliest figure of it appeared in October 1812 in Sims' "Botanical Magazine," t. 1501, under the name *Mimulus luteus*, Linn., with the information: "He [Langsdorff] brought it, we are informed, from Unashka, one of the Fox Islands, and seeds were transmitted to Mr. Hunnemann last spring, and through him to Mr. Donn, Curator of the Botanic Garden at Cambridge, who kindly communicated to us in July last the specimen from which our drawing was made, under the name of *Mimulus Langsdorffii*, which we should have adopted, had it proved, as was supposed, a new discovery." In 1813 De Candolle ("Cat. Monspel.," 127) described it under the name *M. guttatus*, and gave characters that in his judgment showed its distinct specific rank. Pursh, however, in his standard "Flora Amer. Sept.," ii. p. 426, in 1814, retained it under *M. luteus*, L.; and he was followed by most later botanists, including Bentham and Asa Gray. For a fuller statement of the confusion in which the systematic rank of the yellow *Mimuli* of N.W. America long remained, reference must be made to Professor Greene's papers ("Bull. Calif.," i. pp. 106-123, 1885, and "Journ. Bot.," 1895, pp. 4-8), in which will be found the conclusions arrived at by him. Suffice it to say that he accepts *Mimulus Langsdorffii*, Donn, as the correct name of the species naturalised so plentifully in many parts of Britain. He describes and names five varieties of the species, from the west coast or western side of the Rocky Mountains. All our forms appear to belong to the type, though they show considerable differences in luxuriance and in colour and size of flowers.—JAMES W. H. TRAIL.

The Natural History Sub-Committee appointed to make preparations for the Meeting of the British Association in Glasgow in 1901 has in view to prepare a complete list of the flora of "the natural drainage area of the Clyde, and of all the sea lochs which form extensions of its estuary." Information is specially desired as to—(1) distribution of species; (2) papers in magazines, journals, and transactions of societies; (3) names of workers in the different departments that will assist; (4) local herbaria; (5) collections of microscopic objects. All willing to assist are requested to communicate with Professor Scott Elliot at 204 George Street, Glasgow.

CURRENT LITERATURE.

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—January-March 1900.

[The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors will have access to the sources of information undermentioned.]

ZOOLOGY.

NOTE ON THE WEASEL, *PUTORIUS (ICTIS) NIVALIS*, LINN., AND SOME OF ITS SUB-SPECIES. By G. E. H. Barrett-Hamilton. *Ann. and Mag. Nat. Hist.* (7), vol. v. pp. 41-50 (January 1900).—Dark specimen of the form *vulgaris*, Erxleben, from Elgin, alluded to.

SOME REMARKS ON THE BIRDS SEEN IN THE SOUTH-EAST PART OF THE MAINLAND OF ORKNEY IN OCTOBER 1899. By N. F. Ticehurst, M.A., F.Z.S., etc. *Zoologist* (4), vol. iv. pp. 54-64 (February 1900).—Over 50 species dealt with.

NOTES ON THE GENUS *MELOE*. By the Rev. Theodore Wood, F.E.S. *Ent. Record*, vol. xii. pp. 46-47 (February 1900).—*M. violaceus* recorded as occurring on the highroad between Inversnaid and Loch Katrine.

COLEOPTERA AND LEPIDOPTERA AT RANNOCH. By J. J. Walker, R.N., F.L.S. *Ent. Mo. Mag.* (2), vol. xi. pp. 21-28 (January and February 1900).

MACRO-LEPIDOPTERA OF THE GALASHIELS DISTRICT IN 1899. By James C. Haggart. *Entomologist*, vol. xxxiii. pp. 44-46 (February 1900).

COLLECTING IN THE ISLE OF LEWIS. By H. Stuart Fremlin, F.E.S. *Entomologist*, vol. xxxiii. pp. 37-39 (February 1900).—This short paper refers entirely to Lepidoptera, of which 15 species are mentioned.

SMERINTHUS POPULI IN WESTERN SCOTLAND, WITH SOME NOTES ON ITS HABITS. By H. C. Arbuthnott. *Ent. Record*, vol. xii. p. 81 (March 1900).—The Isle of Arran and Bridge-of-Weir (Renfrewshire) are given as localities for this species.

DIPHThERA (AGRIOPIS) *APRILINA* IN MORAY. By Henry H. Brown. *Entomologist*, vol. xxxiii. p. 14 (January 1900).—A specimen found on 8th November at Darnaway Wood, Brodie.

WINTER CAPTURE OF *GONOPTERA LIBATRIX*. By James C. Haggart. *Ent. Record*, vol. xii. p. 27 (January 1900).—A specimen captured at Galashiels on the night of 25th December, with the thermometer registering 20 degrees of frost.

OPORABIA AUTUMNATA FROM RANNOCH, WITH REFERENCE TO SEVERAL OTHER RELATED FORMS. By Louis B. Prout, F.E.S.

Entomologist, vol. xxxiii. pp. 53-61, pls. i. and ii. (March 1900).—This paper attempts to clear up some of the confusion which exists regarding this species and its allies. A number of interesting forms are figured, together with examples of *O. filigrammaria*, H. S., and *dilutata*, Bork., for comparison.

NYSSIA ZONARIA IN THE HEBRIDES. By Arthur F. Griffith. *Ent. Mo. Mag.* (2), vol. xi. (February 1900).—Reported as abundant on the "machars" (sandy pastures) along the western coasts of the Outer Hebrides.

RE-DISCOVERY OF NYSSIA ZONARIA IN THE HEBRIDES. By Chas. G. Barrett. *Ent. Mo. Mag.* (2), vol. xi. pp. 9-10 (January 1900).—This note refers to a male specimen captured in Tiree in April 1899, confirming a statement made 55 years ago as to its occurrence in these islands.

A NEW SPECIES OF TORTRIX REPORTED FROM SHETLAND. By John Hartley Durrant, F.E.S., etc. *Ent. Mo. Mag.* (2), vol. xi. p. 60 (March 1900).—Refers to a strongly marked form named *Tortrix* (*Lozotænia*) *musculinana*, considered by Prof. Kennel as a variety of *T. musculana*, Hb.

THREE LITTLE-KNOWN BRITISH HYMENOPTERA, ETC. By Edward Saunders, F.L.S. *Ent. Mo. Mag.* (2), vol. xi. pp. 51-53 (March 1900).—Scottish specimens of *Pompilus approximatus*, Smith, and *Osmia parietina*, Curt., are referred to.

SCOTTISH RHYNCHOTA. By G. W. Kirkaldy. *Entomologist*, vol. xxxiii. p. 10 (January 1900).—A note referring to the occurrence of three species in Cromarty and one in Perthshire.

NOTES ON CERTAIN DIPTERA OBSERVED IN SCOTLAND DURING THE YEARS 1898-99. By Col. J. W. Verbury, late R.A., F.Z.S., etc. *Ent. Mo. Mag.* (2), vol. xi. pp. 53-57 (March 1900).—Particulars given of the distribution of *Laphria flava*, L., *Syrphus annulipes*, Ztt., *Criorrhina* (*Cynorhina*) *fallax*, L., *Xylota confinis*, Ztt., *Cynomyia alpina*, Ztt., and *Cephenomyia rufibarbis*, Mg.

BRITISH AMPHIPODA OF THE TRIBE HYPERIIDÆ AND THE FAMILIES ORCHESTIIDÆ AND SOME LYSIANASSIDÆ. By Canon Norman, M.A., D.C.L., LL.D., F.R.S., etc. *Ann. and Mag. Nat. Hist.* (7), vol. v. pp. 126-144 and 196-214, pl. vi. (January and February 1900).—A large number of Scottish localities are given for the various species.

NOTES FROM THE GATTY MARINE LABORATORY, ST. ANDREWS. No. XX.—By Prof. M'Intosh, M.D., LL.D., F.R.S., etc. *Ann. and Mag. Nat. Hist.* (7), vol. v. pp. 254-268, pls. vii. and viii., figs. 1 and 2 (March 1900).—Four notes on Marine Worms, partly based on the examination of Scottish material.

ON BRITISH SPECIES OF SIPHONOSTOMA. By M. I. Newbigin, D.Sc. (Lond.). *Ann. and Mag. Nat. Hist.* (7), vol. v. pp. 190-195,

pl. iv.—Critical notes on two species, one of which (*S. diplochaïtos*, Otto) was obtained at the Millport Marine Station.

BOTANY.

NOTES ON THE FLORA OF WEST INVERNESS. By Symers M. M'Vicar. *Trans. Bot. Soc. Edin.*, 1899, pp. 173-185.—Valuable as discussing characteristics of the flora, distribution, shore-zones round lochs, altitudes, etc.

SOME NOTES ON *ANDROMEDA POLIFOLIA*, LINN., WITH SPECIAL REFERENCE TO A NEW STATION IN THE LIDDESDALE DISTRICT OF ROXBURGHSHIRE. By Symington Grieve. *Trans. Bot. Soc. Edin.*, xxi. pp. 144-150, read January 1899.

NOTE ON THE DISCOVERY OF *GENTIANA NIVALIS*, LINN., IN SUTHERLANDSHIRE. By John Lowe, M.D., F.R.S.E. *Trans. Bot. Soc. Edin.*, 1899, xxi. p. 217.—In considerable quantity on rocks down to sea-level near Ardvreck Castle, Assynt.

NOTE ON *ALISMA*. By Arthur Bennett. *Journ. Bot.*, 1900, p. 24.—Refers in part to a variety of *A. Plantago* collected in water several feet deep at King's Myre, Perthshire, 19th August 1885, and sent by Dr. F. B. White, labelled "*var. graminifolium*, Wahlenb." This determination Mr. Bennett confirms.

ON THE FERNS, MOSSES, AND LICHENS OF KERRICK. By Rev. G. M'Connachie. *Trans. Bot. Soc. Edin.*, 1899, xxi. pp. 168-173.—Records the more interesting species in each of several localities in Kirkcudbrightshire.

SPHAGNUM MEDIUM, LIMPR., IN BRITAIN. By Harold W. Monington, F.L.S. *Journ. Bot.*, 1900, pp. 1-3, pl. 405.—The species is described and figured; and among the British localities are Ben More (*Dixon and Binstead*, 1897) and Chapelton Moss, Hamilton (*J. Murray*, 1899), both Scotch.

ON ABNORMAL CONJUGATION IN *SPIROGYRA*. By R. A. Robertson, M.A., B.Sc. *Trans. Bot. Soc. Edin.*, 1899, xxi. pp. 185-191, 2 folding plates.—A careful contribution to the subject.

NOTE ON THE OCCURRENCE OF *ASCOIDEA RUBESCENS*, BREF., IN SCOTLAND. By James A. Terras, B.Sc. *Trans. Bot. Soc. Edin.*, 1899, xxi. pp. 217-218.

EXHIBITED AT MEETING OF 11TH MAY 1899 OF BOTANICAL SOCIETY, EDINBURGH. *Trans. Bot. Soc. Edin.*, xxi. p. 219.—Several *Hymenomyces* from the West of Scotland, and specimens of Silver Fir attacked by *Sirex gigas* and *S. puniceus*.

OBITUARY NOTICES of the following are contained in *Trans. Bot. Soc. Edin.*, 1899, xxi.—Malcolm Dunn (pp. 220-222), Dr. George C. Wallich (pp. 222-224), and Dr. James E. T. Aitchison (pp. 224-229).

REVIEWS.

THE GEOGRAPHY OF MAMMALS. By William Lutley Slater, M.A., F.Z.S., and Philip Lutley Slater, M.A., Ph.D., F.R.S. (London: Kegan Paul, Trench, Trübner and Co., Ltd., 1899.)

This volume affords, in a collected, convenient, and revised form, the valuable series of papers contributed by Mr. W. L. Slater to the "Geographical Magazine" between the years 1894 and 1897. To these have been added chapters dealing with the subject from the Zoological standpoint, and a chapter devoted to marine mammals and their distribution. The book is embellished by 50 illustrations giving excellent portraits of some typical mammals from each of the zoo-geographical regions, and 8 maps showing the regions and their division into sub-regions. The work is a valuable contribution to the important subject upon which it treats; and the fact that Dr. Slater, the founder of the modern system upon which the geographical distribution of animals is based, has revised and edited it, places the book in the forefront of works of its kind. The index, however, is very unsatisfactory, having many shortcomings, which is much to be regretted in a work treating of so many families and species.

OUR RARER BRITISH BREEDING BIRDS: THEIR NESTS, EGGS, AND SUMMER HAUNTS. By Richard Kearton, F.Z.S. Illustrated by Photographs by C. Kearton. (Cassell and Co., Ltd., 1899.)

The title of this book is a decided misnomer, for the Blackcap, the Corn Bunting, the Jay, and other species treated of are certainly *not* among the "rarer British breeding birds." The fact is, the book is a supplement to the author's volume on British Birds' Eggs (1895). It is practically the fourth book on the subject Mr. Kearton has issued in as many years. Like the others, its value lies in the beauty of its illustrations.

We notice in the preface certain observations on the "Wild Bird Protection Laws," claiming that the only real good done in the United Kingdom in the way of bird preservation has been accomplished by private effort. This is not the case in Scotland. But what could private effort accomplish *without the laws*? It is a very easy thing to criticise the Bird, or any other, Acts; but Mr. Kearton fails to tell us what he would have us do—unless, indeed, his extraordinary opinion that prosecutions are undesirable, because they advertise the locality from which the specimens were obtained, can be regarded as such. If so, he takes anything but a lofty view of our duty towards our feathered friends in adversity.

THE LATE WILLIAM LENNON.

IN the death of Mr. William Lennon, of Brooke Street, Dumfries, which occurred on 30th December 1899, there has passed away an ardent student of nature and a most kindly and much respected man. He was one of a family of octogenarians, and had himself entered on his eighty-second year a few weeks ago. He was born in Dryfesdale, and brought up in the parish of Applegarth. There he served an apprenticeship as a shoemaker, and subsequently established himself in business in Annan ; but was afterwards appointed head attendant at the Crichton Royal Institution, and finally became the personal attendant of the late Sir Edward Vavasour. His connection with the Crichton Royal Institution, which continued for over forty years, afforded him many facilities for those natural history pursuits which had a fascination for him from boyhood.

William Lennon's was a busy life, for he devoted every minute of his leisure to the constant plodding after nature's secrets and ways. He was essentially a working-man naturalist, without more than an elementary education. Yet scientific men of fame cultivated his acquaintance and were in regular correspondence with him, while he was a welcome guest in circles far above his own in social position. His love of nature was pure and unselfish.

Lepidoptera were his first study, and his collection of butterflies and moths is perhaps the best local one that has ever been brought together. For the better half of his days, however, Coleoptera engaged his attention almost entirely. As he said himself, in a paper published on this favourite subject—"I have searched almost every field, moor, moss, glen, and stream in the district," and upwards of 1500 species were collected in Dumfriesshire and Galloway alone, so that, thanks to his labours and to those of his predecessor

in the same field, the late Rev. W. Little, of Kirkpatrick-Juxta, and others who are yet with us, we now know the beetle-fauna of the south-west of Scotland as well as any similar area in Great Britain. It fell to his lot to discover some half-dozen new beetles, some new to science, others new to Britain; but all of these were added to the lists in the name of other coleopterists, to whom Mr. Lennon, in the most unselfish way, handed them over. It is within our knowledge that in the case of some of the species Mr. Lennon's name was never even mentioned! One of his discoveries was *Apion cerdo*, a little weevil found on purple vetch on the railway banks below Collin. Another was a water-beetle—*Hydroporus obsoletus*—found in the flood refuse at Kelton after summer freshets.

Although Mr. Lennon's special hobby was beetles, yet he found time to devote odd days to other departments. A very rare, and at the time almost unique, capture of his was a specimen of *Eromene ocella*, a crambite moth which came to his net in a rather curious manner. Passing a window in the Crichton Institution one night in September 1865, very late, he saw the moth on the outside of the glass, having probably been attracted by the light inside. Mr. Lennon tried to open the window, and found it was fixed. But he saw the moth was a rarity, and so without any further hesitation he at once broke the window with his fist and secured the insect! He used to relate with glee that the authorities made him pay the damage, but he was more than pleased to do so. A capture of Mr. Lennon's that led to some little controversy was the finding of what might have turned out to be a new British butterfly. This was in June of 1868, and the butterfly was *Melitea didyma*. One specimen only was found, but as its distinctness from other butterflies taken on the same day was not noticed till a considerable time afterwards, the new species has never been added to the list. At the same time, whether or not there

was some confusion about the origin of the specimen, those who knew Mr. Lennon never had any doubt as to his *bona-fides* in the matter.

The third order of the insects that Mr. Lennon paid attention to was the Hymenoptera. Although he did so in only a very casual way, yet so minute and painstaking was he in his collecting that he got one new species in this Order also. This was a little bee of the genus *Sphécodes*—wild bees of black and red colours that are parasitic on some of their relations.

Mr. Lennon seldom put his splendid experiences into print. The Transactions of the older Dumfries Natural History Society contain one or two of his papers. These are "A List of Lepidoptera taken near Dumfries," communicated in April 1863; "Notes on a few of the Rare Lepidoptera observed in the Vicinity of Dumfries," communicated in January 1864; "Notes on Lepidoptera," communicated in March 1871. To the present society he contributed in February 1878 "The Rarer Coleoptera of the Dumfries District," and in April 1880 "Notes on Rare Beetles." In 1892 he contributed to this magazine ("Annals," 1892, pp. 107-115), in conjunction with Mr. W. D. R. Douglas, a valuable article on "Some Additions to Scottish Coleoptera." To the "Entomologist's Monthly Magazine" he often sent short paragraphs dealing with his more interesting finds.

ROBERT SERVICE.

The Annals of Scottish Natural History

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1900

[JULY

NOTES ON THE LAND MAMMALS OF THE MORAY FIRTH AREA.

By WILLIAM TAYLOR.

SINCE the publication of Messrs. Harvie-Brown and Buckley's "Vertebrate Fauna of the Moray Basin" in 1895, I do not know of a single species having been added to the fauna, though exact localities for less common species have been noted.

CHIROPTERA.

The COMMON BAT (*Vesperugo pipistrellus*) is still abundant and widely distributed. It varies in colour, for I sometimes find specimens rather light brown, and rarely nearly black. Though they infest houses less than they did thirty or forty years ago, they can often be found in clefts of rocks in wooded districts. DAUBENTON'S BAT (*Vespertillio daubentoni*) and the LONG-EARED BAT (*Plecotus auritus*) are both occasionally found. I have seen but few examples of them, and therefore cannot say whether they vary in colour in this part of Scotland. I think one or two more species of Bats may yet be found here. They should be searched for along the rocky banks of rivers falling into the Moray Firth, and sent for identification when the finder has any doubt about them.

INSECTIVORA.

All the British species are common throughout the Moray Firth Basin ; in fact, all the British varieties that I know of occur here. The HEDGEHOG (*Erinaceus europæus*) is plentiful in many districts. MOLES (*Talpa europæa*) abound : brown, gray, yellowish, and whitish ones are caught from time to time.

The COMMON SHREW (*Sorex vulgaris*) in Elginshire appears to be generally much darker in colour in early spring than in summer. In July I have caught light-coloured specimens nearly the colour of the withered grass on the hillocks where I found them. Had such examples been caught in Lewis or Shetland, they might have been made into a new sub-species. I do not think they represented a "variety" ; they had only a faded or sunburned coat during a dry summer. The LESSER SHREW (*Sorex minutus*) is much more common than is generally supposed. It lives, mostly, in woods and bogs, therefore is seldom seen on the road like the Common Shrew. It is so light in weight that it seldom springs the traps, and may thus often escape capture. I cannot say if this species varies much in colour, as I have not seen more than thirty specimens during the past seven years. The WATER SHREW (*Crossopus fodiens*), though not very abundant, is found through our area. It varies greatly in colour, being sometimes nearly white below and sometimes black. I find the teeth also vary in tint.

CARNIVORA.

The WILD CAT (*Felis catus*).—Does such a "species" exist in Scotland? An authority once told me that he did not believe that any *true* examples of *Felis catus* were now to be found in Britain.

Mr. Lydekker, in his book on "British Mammals," gives a picture of a Wild Cat's skull. I think no mammalogist in Britain can distinguish British Wild Cats' skulls from those of some varieties of the domestic race. The Rev. L. Shaw (historian of Moray) observed, about 150 years ago, that there were no Wild Cats in "Moray" except the descendants of cats that had escaped from domestication. The same

might be said of "Moray" to-day. An expert in mammals recently examined a Wild Cat's skin and remarked that he "could not distinguish it from *Felis catus*." I think there was a *little* caution in that remark.

The MARTEN (*Mustela martes*) is now a very rare animal. It is still found in Ross-shire and Inverness-shire at long intervals. In Elginshire I know of no record of it for more than thirty years; but it would be rash to say that it is extinct here, as one or two have been captured in Aberdeenshire within the past few years. The POLECAT (*Mustela putorius*) is as rare now as the Marten in many districts. I have asked gamekeepers about it, and few of them have killed one for over twenty years. The STOAT (*Mustela erminea*) is still plentiful. Many gamekeepers kill twelve or more during the year. In some places they are as common as Weasels. They vary a little in the colour of their summer coat. Sometimes the line of demarkation between the brown and white is not a straight one, but I have seen none here yet with brown spots through the white, as in many specimens of the Irish "species." The WEASEL (*Mustela vulgaris*) is plentiful everywhere. I find it, too, varies in colour. Some are dark brown, and old ones are occasionally light yellowish red. I have seen one or two males with the line of demarkation between brown and white straight and distinct, as is usual in the Stoat. The males are sometimes of great size, the head and body measuring as much as ten inches.

The BADGER (*Meles taxus*) is now unknown in many localities. In my own district it was believed to be extinct twenty years ago, but a fine male was killed within $1\frac{1}{2}$ mile of Lhanbryde about ten years since. Some people believe that one or more still live in woods between Elgin and Fochabers.

The FOX (*Canis vulpes*) still survives. During last year two or more were seen in Elginshire and Nairnshire within two or three miles of the sea.

RODENTIA.

The SQUIRREL (*Sciurus vulgaris*) is plentiful throughout the wooded districts. It varies in colour here as in other

places. I saw one last December that, at a distance, appeared to have the body black and the tail white. It disappeared in the branches, but I thought if I could get its skin and mark it "Utah" or "Colorado" it would(?) stand for a new species. Though the squirrel varies greatly in colour in this part of the country, it varies very little in size. Nor is there any *real* difference in size between the male and female, as I have proved by measuring many adult skulls and limb bones. The BLACK RAT (*Mus rattus*) is believed to be extinct. The GRAY or BROWN RAT (*Mus decumanus*) is a pest nearly everywhere. The HOUSE MOUSE (*Mus musculus*) abounds in all parts of the country. It varies greatly in colour, being sometimes as dark below as above. The FIELD MOUSE (*Mus sylvaticus*) is common everywhere in woods and fields. It varies a good deal in size and colour. Full-grown ones here generally range between 4 and $4\frac{1}{2}$ inches in length of the head and body. I think they change colour sometimes with the season, as a large race here has generally yellow or brown about the neck in summer; while some of the same race have all the neck and belly pure white, without a trace of yellow or brown, during December and January. If this race represents the English *Mus flavicollis* in summer, it must sometimes become *Mus albicollis* in winter. I have no more faith in *Mus flavicollis* and *Mus hirtenses* as species, than I have in the *black-bellied* Water Shrew or *brown-bellied* House Mouse. Age and season has often to do with changes of colour. If such changes are not the "outcome" of a season, they may easily be the "outcome" of a century. The Harvest Mouse (*Mus minutus*) is, I think, unknown in this part of Scotland. The late Rev. Dr. Gordon never found a trace of it after a search of more than seventy years.

The WATER VOLE (*Microtus amphibius*) is very abundant on the banks of most of our streams. All the young ones I have seen are black, and many remain black throughout life, but old ones are often brown, and sometimes piebald. The FIELD VOLE (*Microtus agrestes*) is abundant in most localities, but has never been a plague in Elginshire in my time. The BANK VOLE (*Microtus glareolus*) is also abundant here. It

varies a great deal in colour, having often a bright rufous back with whitish, sometimes dun, under parts. Very often they are dark coloured above, and may at first sight be taken for Field Voles. Writing to Mr. Wm. Evans about Edinburgh specimens of this species, Mr. Oldfield Thomas said: "I was quite doubtful as to whether they were *agrestes* or *glareolus*, as they are so much less rufous than the latter usually is." The same remark might be made about many Elginshire examples.

The COMMON HARE (*Lepus europæus*) is now very scarce. In many districts there are only one or two where twenty could be seen thirty years ago. The MOUNTAIN HARE (*Lepus timidus*) is still found on all our higher hills, but sometimes it comes down to 500-feet level in winter, and to within a few miles of the sea. The RABBIT (*Lepus cuniculus*) is plentiful in most districts. Black and spotted ones are often seen among the wild ones.

UNGULATA.

The only real wild species now is the ROE (*Capreolus capræa*), and it is getting very scarce in many places where it was common about the middle of the century. The RED DEER¹ (*Cervus elaphus*) and FALLOW DEER (*Cervus dama*) are kept in several parks and "forests." We have good evidence that in former times two species of *Bos*, also the Wild Boar, the Wolf, and Beaver, all existed in "Moray."

I am sorry to trespass on the space of the "Annals," but I fear a good many young naturalists are being misled about the value of "species" in mammals. They must understand that many of our British species are anatomically perfectly distinct. For instance, the leg-bones of a Weasel are all we need to distinguish it from a Stoat. The Weasel has the humerus *longer* than the femur, while in all the other species of Mustelidæ that I have examined the humerus is *shorter* than the femur. There is as much difference between the skeleton of a Pigmy Shrew and a Common Shrew as there is between the skeleton of a

¹ We regard the Red Deer to be in most cases a wild species in the "Moray" area.—EDS.

Common Shrew and a Water Shrew, which latter is placed in a different *genus*. The Field Mouse and the Harvest Mouse are equally distinct, and I think Darwinians will agree that all these species have been differentiated for the past ten thousand years or more.

THE GREAT SHEARWATER IN SCOTTISH WATERS.

By ALFRED NEWTON, M.A., F.R.S.

So little is known of the appearance of the Great Shearwater, *Puffinus gravis* (O'Reilly), on the seas and shores of Scotland and its isles, that I may perhaps be allowed to put on record certain facts concerning it which may be new to some readers of this journal, especially as one of them seems to be of rather general interest. In these pages it is unnecessary to refer particularly to prior occurrences of the species in Scottish waters. It is enough to remark that it was not included in the late Mr. Robert Gray's "Birds of the West of Scotland," published in 1871, and that all the known instances, not amounting to half a dozen, have been mentioned in one or other of the volumes of the well-known series of "Vertebrate Faunas" which we owe to Messrs. Harvie-Brown and Buckley. More than this, I may say that Mr. Henry Evans, whose opportunities of observing birds at sea on the west coast of Scotland have been immeasurably greater than those enjoyed by any other naturalist, while his habit of bringing a telescope to bear on almost every bird that comes within range ensures his having made the best use of those opportunities, has informed me that, until the occasion I am about to mention, he never set eye on a Great Shearwater.

On the 27th of June 1894 I had the good fortune to be on board Mr. Evans's yacht while steaming northward up the Great Minch making for North Rona. About noon we came up with the Butt of Lewis, from which we were not very far, and there was almost a dead calm. Soon after I happened to see a pair of birds sitting on the water near the

ship, and as they rose on our approach it was plain that they were Shearwaters of more than the common size. I at once called to Mr. Evans, and he, with his glass immediately upon them, agreed with me. Hardly had we recovered from our surprise at the apparition before another pair presented themselves in like manner, and then another, and yet more. Nearly all were in pairs, dotted about the sea, and few took the trouble to rise from the surface unless we were very close to them. Fewer still were flying about of their own accord. If I remember right, a Manx Shearwater occasionally showed itself, and one was able to compare the two. Though the larger species seemed to have a heavier flight, there was little difference in that respect; but in size and colour the two could not be confounded, and we could tell the one from the other nearly a mile off. The dingy blackish-brown of the larger bird's back, mottled when seen very near with smoke-colour, and the whitish upper tail-coverts, contrasted with the deep black of the same parts of the smaller bird, while the pure white of the latter's lower surface gleamed in comparison with the duller or even clouded look of the former's. Though I had never before seen the species alive, I felt certain that we had before us what was long known as *Puffinus major*. The notes I made at the time have unfortunately been lost, but to the best of my recollection we must have seen at least thirty or even forty pairs, nearly each pair sitting lovingly together.¹ This went on until we were within a few miles of North Rona, after which we saw no more of them. Two days later Mr. Hugh Popham fell in with these birds further to the northward, but of that presently.

On the 24th of June 1895 I had again the pleasure of finding myself on Mr. Evans's yacht. Leaving Castle Bay in the morning, we rounded Barra Head, and our course was laid for St. Kilda. Again the sea was smooth, but a mist hung on the water. We had not got far away from the land when we met with some of our friends of the year before, sitting on the sea in pairs and acting exactly as they did on the former occasion. They seemed, however, to be more

¹ Mr. Evans would put the number still higher, 120 birds, or sixty pairs; and I have no desire to contest his estimate.

numerous. I counted fifty pairs, and then stopped ; but there must have been very many more, for the mist became a thick fog, so that one could only see a short way from the ship, and it was not until much delay on this account that we reached our destination.

Arrived at St. Kilda, Mr. Evans made inquiry of the people, to all of whom, from his frequent visits, he is well known, as to this large kind of Shearwater. Most of them professed their ignorance of it, but some two or three thought they had seen such a bird when fishing at a distance from the land. He offered a suitable reward for a specimen if one could be procured, and so we came away ; but here I may remark that, in accordance with his usual practice of being an observing and not a collecting naturalist, on neither of these occasions was there a gun on board his yacht. On the 27th June, being the anniversary of the day on which we had seen the birds between Lewis and North Rona, we were passing along the very same course, but not a Great Shearwater showed itself.

I am not sure whether it was later in this year, or in the autumn of the next, that two or three Great Shearwaters were seen by Mr. Evans to the southward of Skye. However, in 1897, Mr. Evans, on revisiting St. Kilda, had delivered to him the skin of an undoubted Great Shearwater, which had been killed with an oar by a fisherman at some distance from the islands on the 7th of August in that year. The promised reward was duly paid, and the specimen was most appropriately sent to Mr. W. Eagle Clarke to be placed in the Museum of Science and Art in Edinburgh. Two more, killed by St. Kilda fishermen in the same way, one to the south and the other to the north of the islands, in the fourth week of July 1899, were handed over to Mr. Evans on one of his visits last year, and these he has most kindly given to the Zoological Museum of his old University.

Examining these specimens on their reaching Cambridge, I was at once struck by the state of their plumage. When the birds met their death they were in deep moult, and it was of such a kind that though I will not undertake to assert that they must have been wholly unable to fly, yet their power to do so must have been seriously impaired. Struck

by this fact, I inquired of Mr. Clarke as to the state of the specimen he had received, and he was good enough to inform me that "it too is practically without *outer* primaries, these feathers being only a quarter of their full-grown length or even less." Turning to O'Reilly ("Greenland," etc., London, 1818, p. 140, pl. xii. fig. 1), who happens to have been the first describer of the species, I find that his figure (which Mr. Saunders, with extreme good nature, has called "excellent") represents a bird which was obviously in the same condition—the tip of its wings coming considerably short of that of the tail, which when full grown they should equal or surpass; while Mr. Saunders stated (Yarrell, "British Birds," ed. 4, vol. iv. p. 16) that a specimen labelled as from Greenland, 28th June 1876, in the late Mr. Hargitt's collection, had "the outer primaries in their sheaths and undeveloped."¹ Moreover, Messrs. Harvie-Brown and Barrington, in their report on the ornithology of Rockall as observed in the expeditions of 1896, state ("Trans. Roy. Irish Acad.," vol. xxxi. pt. iii. p. 72), on the authority of Mr. Popham, that of the Great Shearwaters seen by him, as before mentioned, soon after our meeting with them in June 1894, "there were no young birds amongst them, but the old birds could scarcely fly, having apparently moulted out their primaries." That gentleman doubtless obtained specimens which enabled him to make this remark.

I must confess that I was completely deceived by the behaviour of the birds we saw, especially after finding them for the second time disposed in pairs, as they almost invariably were. They reminded me of the pairs of Turtle Doves that rise before or beside one in succession as one crosses a field in England just after their arrival in spring, and I fully believed that these Shearwaters must be on their way to some

¹ I do not know on whose authority Mr. Saunders states ("Manual of British Birds," ed. 2, p. 738) that on alighting this species "strikes the water with great violence, in a manner quite different from that of a Gull, and then dives." I can only say that those we saw settle on the water did so just as other Shearwaters do, and that I did not see one dive, though they doubtless get much of their food in that way. That gentleman is mistaken when he declares that Faber "never handled a specimen." What Faber said was that he never saw the species in life, but that he obtained a stuffed skin from southern Iceland. He also saw a specimen from that island in the Berlin Museum, and mentions a third, which I suppose he had also seen, in the collection of Benicken, believed to have come from Greenland ("Isis," 1824, col. 785).

unknown and unsuspected breeding-place in our northern islands, though where such a place should be I could not suggest.¹ This pretty fancy has, of course, been quite dispelled by the abundant evidence that they are not in breeding condition;² but some compensation is afforded by the interesting fact, now conclusively established, that members of a group like the *Tubinares*, which contains some of the birds best endowed with the power of flight, should so moult their wings as to become almost, if not quite, incapable of it, and I trust the matter will receive due attention from those who have the opportunity of further investigating it. From very ancient times it has been known that the *Anatidæ* become flightless by the simultaneous shedding of their quills after the breeding season, and quite recently the same thing has been shown by Mr. Bonhote and others to occur in other groups, as the *Rallidæ* and *Colymbidæ*, but we could hardly have suspected such rovers of the sea as the *Procellariidæ* to be subject to a disability of the like kind.

I have compared the two specimens obtained off St. Kilda in the fourth week of July 1899 with two in the Strickland Collection (No. 3075 *a* and *b*) in our Museum that are apparently full winged, and the condition of the former may thus be briefly described:—

- A. Wings*—all the primaries new, the first from the outside not exceeding one-third of the full growth;
 second from the outside longer than the preceding, but shorter than the next;
 third from the outside, though the longest in the wing, reaching only the proximal part of the whitish patch on the upper tail-coverts;
 fourth and fifth, more advanced in proportion, but hardly full grown.

Tail—two middle rectrices new and about half grown, the outer pair also new, but all the rest old.

¹ I cannot help here acknowledging the superior intelligence of Faber, who (*ut supra*, col. 786) so long ago rightly divined that the breeding-place of this species lay to the southward of that of the Manx Shearwater.

² See also Dr. Gadow's testimony, cited by Messrs. Harvie-Brown and Barrington (*ut supra*, p. 74), in regard to the specimen shot at Rockall.

- B. *Wings*—all the primaries new, the first from the outside not exceeding one-fifth of the full growth ;
 second from the outside is longer than the preceding, but shorter than the next ;
 third from the outside, the longest in the wing, and reaching the middle of the whitish patch on the upper tail-covert ;
 fourth and fifth as in "A."

Tail—with three new rectrices,—a fourth having been apparently lost through rough treatment, for the new feathers are very tender, and one came away as I was handling the specimen,—all the others old, and two of them much worn and broken.

The lowest tier of outer wing-coverts new in both specimens, and some (though not many) new feathers appearing among the old on various parts.

MAGDALENE COLLEGE, CAMBRIDGE, 31st March 1900.

CONTRIBUTION TO THE ORNITHOLOGY OF KINCARDINESHIRE.

By A. NICOL SIMPSON, F.Z.S.

THE county of Kincardine, or the Mearns, is a maritime one on the eastern seaboard of Scotland. It is bounded on the north and north-west by Aberdeenshire, on the east by the German Ocean, and Forfarshire adjoins it on the south-west limit. It is an irregular triangle,—according to the Ordnance Survey,—with the north-east angle at the mouth of the river Dee, the south angle at the mouth of the river North Esk, and the west angle near Mount Battock. The east side is $30\frac{3}{4}$ miles, the south-west $18\frac{3}{4}$ miles, and the north-west $29\frac{1}{2}$ miles, measuring in a straight line. The distance of seaboard is something like 35 miles. The greater portion of this coast-line is rocky and picturesque, and the cliffs in some places rise to a height of over 200 feet. The area is about 383.4 square miles, or 248,195 acres, of which 1463 are inland sheets of water and 1385 are put down as foreshore. There are about 6000

acres of permanent pasture, and the rest is rough hill or heather, with a considerable portion of the latter given over to grouse and deer. The mean summer temperature is 58° , and the mean winter temperature 37° . Rain or snow falls on an average on 190 days, and the mean depth is $36\frac{1}{2}$ inches annually. The Grampian range crosses the shire from the west, until the village of Muchals is reached. The valley (or Howe of the Mearns) is simply a continuation of the vale of Strathmore.

Many of the birds recorded for Forfarshire on the western boundary may be justly claimed for Kincardineshire, as in the older records these finds are simply put down as being made "at the Montrose Basin." This may indicate either county, as the Basin at Montrose embraces the western limit of Kincardineshire as well as the eastern boundary of Angus. Scattered throughout the county there are a great number of private collections; but, generally speaking, these are composed of birds which have been "set up" more for ornament than as an indication of the richness of the county in this special direction. Although the majority of these might be included, I have refrained in some measure from acknowledging the same, as neither date nor locality can now be ascertained.

Where the letters *H.* and *M.* are used, the reader will understand *H.* stands for the late Colonel H. M. Drummond Hay of Seggieden, and *M.* for Mr. John Milne, Auchinblae, to whose researches I am indebted where these letters are inserted, and which I hereby acknowledge.

MISSEL THRUSH.—Resident and fairly distributed in inland parts. The nest may be found in many of the well-wooded portions of the county.

SONG THRUSH.—Breeds in every quarter of the shire. In winter the lowlands become the feeding-grounds, and if the weather continues severe, large numbers die. The bird appears to suffer where a Sparrow would thrive.

REDWING.—Seems to arrive singly towards the end of autumn, but is seldom seen unless the weather farther north is severe. Stray examples, however, are met now and again even in mild seasons. I have found more Redwings killed by the medium of the telegraph wires than any other species.

FIELDFARE.—From October onwards this bird may be met in flocks. During February of the present year some hundreds lived for weeks about the trees at my house.

BLACKBIRD.—Very common, although much killed down by gardeners, etc. Although it is evident many leave in winter, still during the colder months of the year dozens may be seen about the villages and hamlets in the hardest of weather.

RING OUZEL.—Breeds on the high grounds. In 1894 (25th October) I came across an Ouzel feeding by the wayside on the low-lying portion of the county. This is the latest record I know of the bird's appearance.

COMMON WHEATEAR.—A summer visitor, and breeds regularly throughout the county. I have heard it spoken of as the "Stonechat" by those not acquainted with bird lore. The bird usually reaches the coast about the middle of March, daily increasing in numbers until well into April. It seems to prefer the sea coast to inland parts, being more abundant at the former place.

WHINCHAT.—Only sparingly distributed. Breeds about the hillsides and waste lands.

STONECHAT.—Resident, but by no means a common bird anywhere. A pair in a day's outing is a reward.

REDSTART.—*H.* mentions it as breeding, and it likely does so. I have only noticed it during its spring and autumn journeys.

REDBREAST.—Plentiful in the country all the year round. During early summer the young robins are in evidence everywhere.

WHITETHROAT.—A summer migrant, and breeds regularly over a wide area. I found four nests last year within a radius of eight yards.

BLACKCAP.—I picked up one of these birds one Sunday on the road-way after a snow blizzard early in this year. This seemed a singular occurrence. The bird breeds regularly in selected localities all over the Mearns.

GARDEN WARBLER.—A nest in my garden was robbed, and the birds built a fresh one and hatched out the eggs. Then one of the parents got under the strawberry-net and was hung, and the young died. This is the only pair I have seen nesting, but doubtless the bird will be in other localities.

GOLDEN-CRESTED WREN.—Fairly abundant in the woods along the hillsides. Often seen about gardens, and I remember one getting inside a greenhouse and the owner brought it to me in the belief it was an escape.

CHIFF-CHAFF.—According to *M.*, this bird breeds in Fordoun parish.

WILLOW WREN.—In favourite sites it is fairly common. In the fall I often see it about the gardens in town.

WOOD WREN.—Not by any means a common species, but will be met now and again in suitable localities.

SEDGE WARBLER.—Our Scottish Nightingale. Breeds in bushy banks. Near my house I used to visit a favourite brook side to listen to it. If the singer was silent I would drop a stone into the bush, and no sooner did so than the sweet notes would break forth on the evening stillness.

GRASSHOPPER WARBLER.—Although I have not had the fortune to find a nest of this bird, still I am convinced I heard its notes one evening. The bird itself was hidden by the foliage, but the trilling seemed to me to be from the bird named.

HEDGE SPARROW.—The “Blue Jannet” of the schoolboy. Very common about all hedges and ditches.

LONG-TAILED TIT.—Nests in several woods along the Howe of the Mearns.

GREAT TIT.—Plentiful. Often seen about the trees bordering the turnpikes, where it evidently finds a change of food.

COAL TIT.—Nests in several localities.

BLUE TIT.—Very common about gardens in rural parts. Breeds regularly over the whole county.

TREE CREEPER.—Not by any way familiar. It only breeds in special districts, and that sparingly.

WREN.—This bird can be seen in every locality. A ditch side seems to be the most favourite site for its nest.

PIED WAGTAIL.—Widely distributed from sea-shore to hillside.

GRAY WAGTAIL.—To be seen about the streams occasionally.

YELLOW WAGTAIL.—Not uncommon, and breeds annually here and there.

MEADOW PIPIT.—Fairly distributed, but not common by any means. It appears to be more abundant towards the sea border than inland.

TREE PIPIT.—I give this as breeding in the parish of Fordoun, on the authority of *M.*

ROCK PIPIT.—Along the whole sea margin this species is fairly plentiful.

SPOTTED FLYCATCHER.—A summer migrant to the county. It is more common, I think, than some suppose.

SWALLOW.—Comes in April and leaves in September. Very abundant. Have known stray birds to linger on to October and November.

MARTIN.—Plentiful along coast, and about towns and villages, etc.

SAND MARTIN.—Usually arrives and departs earlier than the two last named. It is common where there are sand-pits.

GOLDFINCH.—Formerly this bird was scattered all over the county, but for many years it has been a *rara avis*. There are numerous stories of its having been found nesting within the county of recent years, but these reports seem to me to be without any strong foundation in fact.

SISKIN.—The same may be said of this bird as of the last ; only the Siskin is caught occasionally in severe winters. I know of no nest.

GREENFINCH.—Broadly speaking, this is a common bird, and yet one never sees it in abundance during summer. In winter its numbers are no doubt added to, when its presence is forced more upon one's notice.

HOUSE SPARROW.—Somewhat too common, if one may judge by reports circulated by farmers and land-tillers generally.

TREE SPARROW.—*H.* informed me he had found it breeding in this shire, but so far I have been unable to confirm this.

CHAFFINCH.—The most plentiful of all our finches. In my young days the bird was a cage pet, but this seems a thing of the past.

BRAMBLING.—Often caught in winter. Some years it is more abundant than in others.

LINNET.—A home bird in every sense, but its numbers have diminished since I was a youth.

LESSER REDPOLE.—Not plentiful, but nests, and is often caught in winter along with Linnets and the like.

TWITE.—Reported from Strathfindla Hill (*M.*), but personally I have only seen it near the coast side.

BULLFINCH.—Breeds regularly in all the woods of any importance on the northern side of the shire. Large numbers are trapped annually about the villages. Have seen the birds repeatedly about Auchinblae and beside my house at times.

COMMON CROSSBILL.—Not rare, and not common. The species nests in Drumtochty Glen, and doubtless in other places.

REED BUNTING.—Breeds annually in certain districts, but not very common. Specimens are sometimes secured in autumn by bird-catchers.

CORN BUNTING.—A regular breeder, but I think it more abundant towards the sea-shore than in rural parts.

YELLOW BUNTING.—This is a very common bird in almost every locality.

SNOW BUNTING.—A nest is recorded about the year 1859 by *M.*, who still has one of the eggs. Although a *rara avis* as a breeding species, it is by no means a stranger during winter time. This year I saw some hundreds of them on the sea coast several times, and more than a dozen one day on my garden lawn.

SKYLARK.—Widely distributed, but not so numerous as it was thirty years ago, or less. During severe winters thousands may be seen along the sea-coast, the poor birds being driven before the sleety showers.

STARLING.—The most daring bird about town or hamlet. In my egg-collecting days (1868-73) it was an unique prize to secure an example of the Starling, and many an exciting hunt I could record as illustrating the value of this bird's eggs. Nowadays the Starling is located in every hole and corner, and one cannot erect a dovecot without running the risk of its first tenants being Starlings. It is the bird's adaptability to situations that has given it such a firm grip in these shires. It is a lovely bird, and I should be sorry to see it absent, with its stirring song on the chimney-tops in the early summer mornings.

MAGPIE.—Extremely local, and far from plentiful. The last example of the species I came across was in the Glen of Dye in the late fall of 1898. The keepers shot these birds in season and out of season.

JACKDAW.—Abundant in the towns. Local in the country. Some breed in a rookery near my place, and often one or two are seen in the fields in company with the rooks. Now and again a white specimen turns up.

CARRION CROW.—This is a resident, breeding in the deeper woods. Towards autumn and throughout winter it is to be found at the coast side near St. Cyrus, Johnshaven, Bervie, and indeed along the whole margin of the county—seawards.

HOODED CROW.—Far more common than the last named, although neither are to be classed as prevalent.

RAVEN.—Only known to tradition. Several items of interest might be mentioned,—all more or less of an interesting nature,—but at best these are simply echoes of romance.

ROOK.—Very abundant. Farmers of late have been seriously considering the thinning of rookeries, and gunners have been active, but the Rook seems to thrive under it all. I have seen cream, brown, and white examples. These birds do not, as a rule, take kindly to fir trees, but about Fordoun they by no means object to place their domiciles on the branches of these trees.

SWIFT.—Universal. No summer is complete without this weird screamer. It is designated the “Swallow Hawk.”

NIGHT-JAR.—Have observed this bird in June and July, and although not abundant it is a breeder annually about the glens of the county.

LESSER SPOTTED WOODPECKER.—Dr. Howden recorded this bird as having been got at Craigo. [We much doubt the identity of this specimen.—EDS.]

GREEN WOODPECKER.—H., in his notes on the ornithology of the east of Scotland, says: “There are several instances of this bird having been got in the eastern counties of the Union, from time to time.” [This again requires confirmation.—EDS.]

WRYNECK.—Like H., I am of opinion it should be recorded for the county, although no actual observation has been recorded.

KINGFISHER.—Breeds on the North Esk, and is seen occasionally about some of the other streams and waterways. In 1893 one was observed on the Luther Burn.

CUCKOO.—Every spring brings quite a number to the county. Have seen the birds *en voyage* several times, and hear them almost daily in the parish of Fordoun. Numerous instances are to hand of their eggs being got, and also of the birds themselves being kept under confined conditions.

(*To be continued.*)

ON COPEPODS LIVING IN THE NOSTRILS OF FISHES.

By THOMAS SCOTT, F.L.S., etc.

IN the course of some recent researches on fishes and their parasites, I have on various occasions made an examination of the nostrils of fishes, and have frequently obtained free-moving Copepods within these organs, apparently living on the mucus that is usually present. Where this mucus comes from—that is, whether it is secreted by a special gland within the nostrils themselves, or enters into them from the outside skin of the fish—is a question about which, in view of a paper lately published in the Journal of the Linnæan

Society of London,¹ there seems still to be some diversity of opinion. This question, however, does not need to be discussed here. The point of interest in the following remarks is rather the fact that Copepods are found in the nostrils of fishes, living apparently on the mucus they contain.

I have found free-moving (not fixed) Copepods in the nostrils of the following fishes:—The Lump sucker (*Cyclopterus lumpus*); Cod (*Gadus callarius*); Whiting (*Gadus merlangus*); Pollack (*Gadus pollachius*); Plaice (*Pleuronectes platessa*); and Flounder (*Pleuronectes flesus*). All the Copepods that have hitherto been observed in the nostrils of these fishes belong to the genus *Bomolochus*, which was instituted by Professor Alex. von Nordmann in 1832 for a Copepod found on the gills of a fish from the Red Sea, and which is now known as *Bomolochus parvulus*, Nordmann.² On the other hand, the specimens obtained in the nostrils of the fishes I have mentioned appear all to belong to a species described by Professor Claus under the name of *Bomolochus soleæ*, from specimens which had been found on the Sole (*Solea vulgaris*). I am not sure as to what part of the Sole the specimens described by Professor Claus were taken from; but I may state that several years ago one or two specimens of a Copepod supposed to belong to Claus' species were found adhering to the *coloured* side of a Sole captured in the Humber near Grimsby. It may also be stated that there is in part iii. of the "Eleventh Annual Report of the Fishery Board for Scotland" a description, with drawings, of a specimen of the same Copepod species which was found amongst some dredged material collected in the Fluke Hole off St. Monans, Firth of Forth, in 1892.

The genus *Bomolochus* belongs to the Ergasilidæ, a family which contains two other genera besides the one mentioned, viz. *Ergasilus*, Nordmann; and *Thersites*, Pagenstecher. Dr. Basset Smith has published an excellent paper in the "Proceedings of the Zoological Society of London" for April 1899, in which he gives a "Systematic Description of Parasitic Copepoda found on Fishes." The number of

¹ "On the Presence of Nasal Secretory Sacs and a Naso-pharyngeal Communication in Teleostei," by H. M. Kyle, M.A. ("Journ. Linn. Soc.," Zool., vol. xxvii. p. 451 *et seq.*, April 1900).

² "Mikrographische Beiträge," Zweites Heft, p. 135 (1832).

species belonging to the Ergasilidæ noticed in this paper is twenty-two, and thirteen of them belong to the genus *Bomolochus*. On referring to the *habitats* of the various species, not only of *Bomolochus* but also of those belonging to the other two genera, we find that in no case are any of them described as occurring in fishes' nostrils. This is the more remarkable from the fact that *Bomolochus* does not seem to be at all rare, especially in the nostrils of the Cod. Moreover, the Copepods are not limited in their distribution to the Cod-fishes of the north-east of Scotland, for my son informs me that quite recently he has found them in the nostrils of Cod caught in the Irish Sea. As a matter of fact, they are found in the nostrils of most of the Cod-fishes I examine; frequently several, and occasionally a considerable number of, specimens are found in the nostrils of a single fish. In the nostrils of a moderately large Cod from the Moray Firth I found as many as twenty-nine specimens of *Bomolochus*. They included males, females (carrying ovisacs), and young. In the nostrils of another Cod caught in the salmon-nets in the Bay of Nigg, near Aberdeen, twenty-four specimens were obtained; several of these, when removed from the mucus with which they were surrounded and put into clean water, were very lively and very pretty. In seeking for them, the method I adopt is very simple. With the edge of my knife I press gently but steadily on the skin behind the nostrils till the mucus is forced out of the openings, when the Copepods, if they be present, usually appear as whitish specks amongst the mucus; but as some may be more transparent than others, it is better to transfer the mucus into some water in a shallow glass vessel placed on a sheet of black paper, or other dark-coloured substance. The mucus can then be spread out with a camel's-hair pencil, when the Copepods will come clearly into view, and especially if the eyes be assisted with a hand-lens.

The fact that the same species of *Bomolochus* should be found in the nostrils of such distinctly different fishes as the Lump-sucker, the Cod, and the Plaice, is of interest as showing a greater adaptability than would seem to be the case with some other of our parasitic Copepods affecting fishes.

NOTES ON WIGTOWNSHIRE LEPIDOPTERA.

By K. J. MORTON, F.E.S.

DURING July of last year I was in Wigtownshire, and, although my undivided attention was not given to Lepidoptera, I collected a very considerable number of representatives of that order. Some of the species that the Messrs. Gordon of Corsemalzie have already recorded from the county show its Lepidopterous fauna to be an interesting one. Much, however, remains to be done, and the following notes about the species I met with, even if they do not include anything very much out of the common, may still add a little to our knowledge of the district.

The greater part of my collecting was done about Monreith, but I paid visits to other localities within a distance of ten or twelve miles. No late night-work was done worth speaking of, and nearly all the *Noctuæ* were captured at or soon after dusk, either in flight or at flowers—a large umbellifer growing in and about one of the burns (water hemlock?) attracting swarms of the commoner species of *Agrotis*, *Noctua*, etc.

Butterflies abounded. *Pieris brassicæ* was common, the different appearance of the individuals suggesting local origin and immigration; some with gray tips to the forewings being in beautiful condition. The apparently complete absence of *P. rapæ* was remarkable, surely showing an unusually sharp separation of the broods. (In my garden in Edinburgh I took of this species, on the 17th June, a series in good condition, ranging from the immaculate form of the ♂ to examples in which the gray tips were pretty dark. On my return home, I appear to have taken the first examples of the second brood on 10th August, most of the males having very black forewing tips, but a few less so than in the extreme form of the early brood; many of the females of the second brood seem to be more yellowish than usual, and all the examples of this brood are exceptionally large and fine.) *P. napi* was exceedingly abundant, almost all, I think, of the second brood; the long series agrees, on the whole, in appearance with a series from Co. Monaghan, Ireland.

Argynnis selene was represented by a few females found in the grassy places on the worked-out margins of some of the peat-bogs.

Vanessa urticae was rather scarce both as larva and perfect insect; probably the latter was just appearing at the end of the month, while most of the larvæ had pupated before I began to look for them. *V. atalanta* was much commoner, a good many worn examples being seen at the beginning of the month, when larvæ also abounded; and the fresh imagos were beginning to come out towards the end of the month. To *Satyrus semele* should almost be ascribed the first place for abundance, its only rival being *Epinephile janira*. A ♂ of the latter, with the wings concolorous and pale almost as in some females of the mountain form of *typhon*, was a prize. *E. hyperanthus* was pointed out by Mr. Gordon at Corsemalzie, the only place where I saw it. *Cænonympha typhon*: I was unfortunately too late to get this interesting insect in perfection. Some of the males approach very closely indeed to Witherslack males on the upper side, and the tone of the under side is not very dissimilar, but the size of the eye-spots is not quite so large; the females, on the other hand, as far as I can judge, are smaller than in the Witherslack insect. My material, however, is not so good as I should like. *C. pamphilus*, common; *P. phleas*, also common. *Lycæna astrarche*, var. *artaxerxes*, occurred in several localities on or near the coast, but in only one was I able to procure a useful series, which shows the insect to be more typical of the northern form than I expected, although on the under side the comparatively blind spots found in most of my Perthshire examples give place in the majority of the Wigtownshire ones to fairly distinct eye-spots with rather wide white rings. I regret being unable to make a comparison with examples from east and west of the northern part of England. *L. icarus* appeared to me to be much bluer (less lilac) than usual; it was frequent. *Hesperia sylvanus* I was delighted to find rather commonly in grassy places about the peat-bogs, and it also occurred on the coast. Nowadays this species, as far as Scotland is concerned, seems to be confined almost entirely to the Solway area. I was disappointed in not getting one or two other butterflies.

A. aglaia I believe I saw ; and *P. megæra*, which is found on this coast, I just missed, Mr. Gordon having informed me that it was common after I left.

A single larva of *Macroglossa stellatarum* was found feeding on *Galium verum* ; it pupated all right, but has not emerged. *Nudaria mundana* swarmed about stone walls on some evenings. *Nemeophila plantaginis* was seen in several localities, and odd examples of *Spilosoma lubricepeda*, *menthastris*, and *Hepialus velleda* were picked up. Only one larva of *Bombyx quercus*, var. *callunæ*, was seen ; the ♂ imago was observed in several localities, but none was taken, and I am unable to say whether the specimens present any local peculiarities. A worn ♀ was captured. The larvæ of the *Notodontidæ* were still too small to take : one or two species were noticed.

As already indicated, full justice was not done to the *Noctuæ*, and I do little more than record the names of those taken. *Acronycta rumicis*, *Leucania conigera*, *lithargyria*, *impura*, *pallens* ; *Xylophasia lithoxylea*, *monoglyphæ* ; *Charæas graminis* ; *Cerigo matura*, one worn example ; *Hama furva*, two examples ; *Mamestra brassicæ*, *Apamea basilinea*, *gemina*, *didyma*, the last most abundant and variable as usual ; *Miana fasciuncula*, *furuncula*, and *arcuosa* ; *Caradrina morphæus* and *blanda*, *Agrotis segetum*, *exclamationis*, *tritici* rather common at ragwort, and including some pretty forms ; *strigula*, common on the bogs ; *lucernea*, one small example, very much darker than any other I possess ; *Noctua plecta*, *c-nigrum*, *baja*, *brunnea*, *festiva*, *umbrosa*, and *xanthographa* ; *Triphæna janthina*, *concs*, and *pronuba* ; *Hadena dentina* and *oleracea* ; *Euplexia lucipara*, *Habrostola triplasia*, *Plusia chrysitis* ; *Anarta myrtilli*, rather common ; *Chariclea umbra*, *Herminia grisealis*, and *Hypena proboscidalis*.

Rumia luteolata ; *Metrocampa margaritaria* common in Monreith Park, where *Cleora lichenaria* also occurred frequently ; *Boarmia repandata* not common ; *Gnophos obscuraria* very common on the coast ; *Pseudopterna pruniata* frequent ; *Acidalia dimidiata* and *bisetata* both very common ; *marginipunctata* one example ; *fumata* very common on the bogs ; *aversata* frequent ; *Cabera pusaria* ; *Ematurga atomaria* very common on the bogs, and having, especially on the under side, a yellowish tint little evident

in more northern examples; *Abraxas grossulariata* very common amongst sloe; *Larentia didymata*, *viridaria*; *Emmelesia affinitata*, *alchemillata*, *albulata*, and *decolorata*; *Eupithecia oblongata* and *constrictata* were rather common on the coast; *nanata* abundant on moors; *Hypsipetes elutata*; *Melanthia ocellata* common; *Melanippe sociata*, *montanata*; *galiata* rare; *fluctuata*; *Coremia propugnata*; *Camptogramma bilineata*; *Cidaria fulvata* common; *Eubolia plumbaria* and *limitata* both common; *Anaitis plagiata* and *Tanagra atrata* both frequent.

Of the smaller species I took only a very limited number of examples; but as so little is known about the distribution of these, it may be well to mention them.

Aglossa pinguinalis, *Scoparia ambigua* and *dubitalis*, *Nomophila hybridalis*, *Herbula cespitalis*, *Eurypyrha urtica* very common, *Scopula ferrugalis* and *lutealis*, *Hydrocampa nymphæata*, *Crambus pascuellus*, *culmellus*, *hortuellus*, *perlellus*, *pratellus*, *tristellus*, *geniculeus*, *Anerestia lotella*, *Homæosoma nimbella*, *Phycis adornatella* (*dilutella*), *Tortrix viburnana*, *Argyrotoxa conwayana*, *Sericoris urticana* and *lacunana*, *Euchromia purpurana*, *Grapholitha sub-ocellana*, *trimaculana*, and *nævana*, *Ephippiphora scutulana*, *Dicrostampa petiverana*, *Catoptria cana*, *fulvana*, *Xanthosetia zoegana* and *hamana*, *Conchylis straminea*, *Aphelia osseana*, *Symæthis oxyacanthella*, *Tinea pellionella*, *Gelechia marmorea*, *terrella*, *Laverna atra*, *Plutella annulatella*, and *Coleophora nigricella*.

One or two of the minute forms remain undetermined.

RECORDS OF SCOTTISH PLANTS FOR 1899, ADDITIONAL TO WATSON'S "TOPO- GRAPHICAL BOTANY," 2nd Ed. (1883).

By ARTHUR BENNETT, F.L.S.

MANY of these records may be found in Professor Trail's "Topographical Botany of Scotland," but they were communicated to him by me in advance, and it seems best to keep up the continuity of these records.

The abbreviations, etc., are the same as in former records, viz. "Ann. S. N. H." = "Annals of Scottish Natural History"; "J. B." = "Journal of Botany"; *sp.* denotes that a specimen was sent me, and ! denotes that I have seen a specimen labelled as from the county.

73. KIRKCUDBRIGHT.

Hierochloe borealis, *Miss Mittelbach, sp., ex* Rev. G. M'Conachie and J. M'Andrew.

74. WIGTOWN.

Scirpus Tabernæmontani, *J. M'Andrew, sp.*

The following, *ex* Druce, in "Ann. S. N. H.," 1899, p. 31—

<i>Viola canina</i> and <i>V. Curtisii</i> .	<i>Atriplex calotheca</i> , ? Fr.
† <i>Melilotus officinalis</i> .	† <i>Rumex alpinus</i> .
† <i>Pyrus intermedia</i> .	<i>Glyceria plicata</i> .
<i>Galium erectum</i> .	† <i>Hordeum murinum</i> .
† <i>Chrysanthemum Parthenium</i> .	<i>Agrostis pumila</i> , <i>l.c.</i> 1898, p. 243.
<i>Gentiana baltica</i> , Murb.	

77. LANARK.

<i>Rubus fissus</i>	} <i>C. H. Waddell</i> , "J. B.," 1899, p. 225.
„ <i>corylifolius</i> , <i>var.</i>	
„ <i>hirtifolius</i> , Muell. and Wirtg.	

83. EDINBURGH.

<i>Myriophyllum alternifolium</i>	} <i>F. C. Crawford</i> (confirms record).
<i>Carex curta</i>	
<i>Campanula latifolia, sp.</i>	} <i>Renoul and Somerville</i> .
<i>Taxus baccata, sp.</i>	
<i>Juncus glaucus, sp.</i>	

86. STIRLING.

<i>Rubus Rogersii</i> , Linton, <i>C. H. Waddell</i> , "J. B.," 1899, p. 225.	
† <i>Stachys annua</i>	} <i>Kidston and Stirling</i> !
<i>Lemna gibba</i>	

88. MID PERTH.

Euphrasia foulaensis, *Townsend*.

Carex "helvola," Blytt, *Druce*, "J. B.," 1898, p. 157.

„ *rostrata* × *vesicaria*, *Marshall*, "J. B.," 1898, p. 73.

Agrostis pumila, *Druce*, "J. B.," 1898, p. 243.

Poa flexuosa, Wahl, *Druce*, "Ann. S. N. H.," 1898, p. 122

90. FORFAR.

Rosa involuta, *Barclay*, "Ann. S. N. H.," 1899, p. 118.

Mentha sativa, *paludosa* } *Somerville*, *sp.*

Ballota ruderalis

Carex aquatica × *rigida*, *Marshall*, "J. B.," 1898, p. 73.

92. SOUTH ABERDEEN.

Euphrasia foulaensis, *Townsend*.

Carex rostrata × *vesicaria*, *Druce*, "Ann. S. N. H.," 1899, p. 58.

94. BANFF.

<i>Hieracium chrysanthum</i>	} <i>Marshall and Shoolbred</i> ,
" <i>senescens</i>	
" <i>graniticolum</i> , W. R. Linton.	

"J. B.," 1899, p. 385.

95. ELGIN.

Rosa dumetorum, *Thuill.* } *Druce*, "Ann. S. N. H.," 1898, p. 122.

" *coriifolia*, *Fr.*

Viola canina and *V. lutea* } *Marshall and Shoolbred*, "J. B.," 1899,

Sagina ciliata

p. 383.

Trifolium dubium. *Gentiana baltica*, *Murbeck*.

Rubus Rogersii, *Linton*. *Utricularia neglecta*.

" *villicaulis*. *Rumex conglomeratus*.

" *radula*. " *Hydrolapathum*.

" *melanoxylon*, *Muell. and Wirtg.* *Orchis latifolia*.

Typha latifolia.

Carduus tenuiflorus. *Sparganium affine*.

Hieracium saxifragum, *var.* *Scirpus uniglumis*.

Taraxacum erythrospermum. *Triticum junceum*.

96. EASTERNESS.

Ranunculus Drouetii, *Marshall and Shoolbred*, "J. B.," 1899, p. 383.

Caltha "radicans, *var. zetlandica*, *Beeby*."

Sagina apetala.

Rubus melanoxylon, *Muell. and Wirtg.*

Hieracium graniticolum, W. R. Linton.

" *truncatum*. *Rumex acutus*, *L.*

" *Dewari*, *Syme*. *Typha latifolia*.

" *reticulatum*. *Sparganium simplex*.

Gentiana uliginosa ? *Scirpus uniglumis*.

Rumex propinquus, *Aresch*. *Elymus arenarius*.

97. WESTERNESS.

Valeriana Mikani, *S. M. Macvicar, sp.*

Hieracium truncatum, Lindeb., *Marshall* and *Shoolbred*, "J. B.," 1899, p. 385.

Gymnadenia conopsea \times albida, *Wolley-Dod* in "J. B.," 1898, p. 352.

Carex $\text{\textcircled{E}}$ deri, *var. cedocarpa*, Anderss., *Marshall*, "J. B.," 1898, p. 72.

98. ARGYLE.

Rubus melanoxyton, Muell. and Wirtg., *Marshall* and *Shoolbred*, "J. B.," 1899, p. 385.

Lithospermum officinale, *S. M. Macvicar, sp.*

Carex aquatica \times rigida

„ Goodenovii \times rigida

„ Hornschuchiana \times $\text{\textcircled{E}}$ deri

} *Marshall*, "J. B.," 1898, p. 73.

Agrostis pumila, *Druce*, "Ann. S. N. H.," 1898, p. 243.

99. DUMBARTON.

(All *L. Watt, sps.*)

Sibbaldia procumbens, *P. Auth.* †Solanium nigrum.

Saussurea alpina (Syme herb. !), Lemna trisulca.

P. Auth.

Lycopodium alpinum.

Vaccinium uliginosum.

Equisetum sylvaticum, *P. Auth.*

†Hyoscyamus niger.

100. CLYDE ISLES.

Carex disticha, *A. Somerville, sp.* Carex limosa, *seg., F. C. Crawford!*

101. CANTIRE.

Spergula sativa!

Valeriana Mikani.

Agrimonia odorata!

Cephalanthera ensifolia! *W. E.*

Galium erectum!

Nicholson.

„ boreale, *C. Adeney.*

Zostera nana, *sp.*

The above all *ex C. E. Salmon.*

The following *ex A. Somerville—*

Silene Cucubalus

Potentilla procumbens

Callitriche autumnalis

} *M^cRae, sp.* Myosotis repens, *sp.*
†Euphorbia Peplus, *M^cRae!*
Salix Caprea

Sium erectum, *sp.*

„ ambigua

†Inula Helenium, *M^cRae, sp.*

„ laurina, Sm.

Vaccinium uliginosum, *sp.*

„ rubra, Huds.

} *teste, Rev. Linton.*

<i>Salix herbacea</i> , <i>sp.</i>	<i>Carex xanthocarpa</i> , <i>sp.</i>
<i>Orchis incarnata</i> , <i>sp.</i>	<i>Festuca rubra</i> , " <i>arenaria</i> ," <i>sp.</i>
<i>Listera cordata</i> , <i>sp.</i>	<i>Ophioglossum vulgatum</i> , <i>sp.</i>
<i>Potamogeton nitens</i> .	<i>Lycopodium alpinum</i> , <i>sp.</i>
" <i>pectinatus</i>	} <i>M^cRae</i> , <i>sp.</i>
<i>Typha latifolia</i>	

102. SOUTH EBUDES.

Prunus insititia, *Dr. Gilmour*, *sp.*

104. NORTH EBUDES.

Carex xanthocarpa, *Druce*, "Ann. S. N. H.," 1898, p. 243.
Agrostis pumila, *Druce*, *l.c.*

105. WEST ROSS.

Drosera intermedia. A misprint in "Scot. Nat.," 1891, p. 186 ;
but it may stand on authority of A. Evans, 1890.

Geranium lucidum, *P. Ewing*, 1891.

Hypericum perforatum, *P. Ewing*.

Myriophyllum spicatum, *P. Ewing*!

Callitriche autumnalis. "Druce *ex* Newbould" I have ; but Mr.
Druce does not notice it in "Edin. Bot. Soc. Trans."

Epilobium alsinefolium, *D. Russell*! I have a note, "Druce, 7,
1887"; but see Mr. Druce, *l.c.* p. 142.

Galium uliginosum in "Top. Bot.," *Druce*.

Hieracium argenteum, *Druce*, "Ann. S. N. H.," 1898, p. 122.

Trientalis europæa, *D. Russell*, *sp.*

† *Plantago media*, *D. Russell*!

Salix pentandra, "Druce *ex* Newbould." See Mr. Druce's remarks,
l.c., a mistake?

Juniperus communis, "Druce *ex* Newbould," a mistake?

Carex limosa, *Druce*, "Ann. S. N. H.," 1898, p. 122.

Lycopodium inundatum, *D. Russell*!

P. Auth.

Asplenium obtusum, *D. Russell*!

106. EAST ROSS.

Rubus villicaulis, *Marshall* and *Shoobred*, "J. B.," 1899, p. 384.

Carex Hornschuchiana × *Æderi*, *Marshall*, "J. B.," 1898, p. 73.

107. EAST SUTHERLAND.

Artemisia vulgaris, *C. E. Salmon*.

Lobelia Dortmanna, *C. E. Salmon*.

108. WEST SUTHERLAND.

(All from *C. E. Salmon*, except *G. nivalis*.)*Spergula sativa*.

<i>Hieracium Marshalli</i>	} <i>Linton, det.</i>
„ <i>sarcophyllum</i>	

Centaurea Cyanus. *Rhinanthus major*.

Gentiana nivalis, *Dr. J. Lowe*, "Trans. Bot. Soc. Edin." 1899, xxi.
 p. 217, "Loch Assynt." *Dr. Lowe* says he has now no specimen,
 but had no doubt of the plant, knowing it in Norway.

Euphrasia foulaensis. *Isoetes lacustris*.

109. CAITHNESS.

Spergularia marginata, *Stroma Isle*, *Miss Geldart, sp.**Euphrasia latifolia*, *Pursh.*, *Marshall*, "J. B.," 1898, p. 274.„ *foulaensis*, *Townsend*.

110. OUTER HEBRIDES.

(All from *W. S. Duncan*.)†*Fumaria pallidiflora, sp.* *Geranium Robertianum, sp.**Viola canina, sp.* *Juncus trifidus, sp.**Agropyron acutum*, *R. and S.*, *teste Hackel*.*Polypodium Dryopteris, sp.*

111. ORKNEY.

<i>Fumaria confusa</i>	} <i>Somerville, sp.</i>
<i>Epilobium parviflorum</i>	

Euphrasia foulaensis, *Townsend*.

NOTES ON THE FLORA OF PERTHSHIRE.

By G. CLARIDGE DRUCE, M.A., F.L.S.

DURING the summers of 1897, 1898, and 1899 I visited several portions of the rich county of Perth, chiefly with a view to study some of the critical forms, and for the last two years have had the advantage of the company of the Rev. H. J. Riddelsdell. About ten days were spent on the Ben Lawers group, and all of these were good days for the mountains, while the drought of the two latter years has not been favourable to the growth of grasses or sedges. I was pleased to see that two of the rarities—*Gentiana nivalis*

and *Saxifraga cernua*—were not less plentiful than they were twenty years ago ; but *S. rivularis* is so scarce that a single collector might easily eradicate it. The rich rocks of Creagan-Lochain had one day allotted to them, when *Hieracium insulare*, var. *petrochatis*, was in especially fine flower. Another day was devoted to the Perthshire side of Beinn Laoigh. Mr. H. N. Dixon has already elsewhere given an account of the mosses he found on his expedition to Beinn Heisgarnich, which was first alluded to as a botanical hunting-ground in Lightfoot's "Flora Scotica" of 1774, where it is called Ben Teskerney. It took some considerable time, for a Southron unversed in Gaelic, to identify this with the mountain on the Ordnance Maps spelt Beinn Heisgarnich. This hill is situated about ten miles from Tyndrum, on the south-eastern side of Loch Lyon ; and the walk to it from Tyndrum, which we shortened by taking a machine for three miles, is at the best a long and wearisome approach by the Allt Chonoglais, although Beinn Doireann rears its finely shaped mass boldly up to the north, and the south-eastern side is blocked by the bold cliffs of Beinn a Chaisteil. Afterwards there is little to interest one as one passes by the south of Beinn Vennoch to Loch Lyon, at the head of which there is considerable marshy ground worthy of systematic investigation. We made the ascent of the western shoulder of Ben Heasgarnich, on which, and in the corrie, there is a large deposit of peat ; and eventually, after a rough climb, were rewarded by a sight of the magnificent cirque with a grand rocky coronet, which would require many visits to work with any degree of finality. The summit, 3530 feet high, is not particularly interesting, and the descent to Allt Foinn-a-Glinne is down a grassy slope of a very considerable degree of steepness. Although there is no loch in the corrie, a multitude of small watercourses offer some very interesting botanising. Another day was spent on Glas Thulachan, which we visited from the Spital of Glenshee, and this also necessitates a rather wearisome walk by the Allt Ghlinn Thoilneicht to its junction with the stream issuing from Glas Thulachan itself. The corrie is rather extensive, but the rocks are not very bold—at any rate they did not seem so to ourselves, just fresh from the precipices of Lochnagar.

The height of the summit is 3445 feet ; and there is a considerable quantity of white quartz in the cliffs, especially on the northern side. The moorland on the ascent afforded a very luxuriant growth of the Cloudberry, with more abundant and more perfectly ripe fruit than I had before observed. To me it is very agreeable, although my companion, the Rev. H. J. Riddelsdell, affected to despise it. But the ascent was made on the hottest day we experienced in Scotland of the hot year 1899 ; and the toilsome ascent over heather and *Molinia*, and the plague of flies, may have affected us in a different manner. One of the conspicuous features of the rocks was the abundance of *Saxifraga oppositifolia* ; and *Sibbaldia* was frequent and very luxuriant, notwithstanding the dry season which allowed us to cross the extensive peat-bogs without difficulty.

In the following notes, for the sake of convenience, I have practically followed the sequence adopted in the "Flora of Perthshire" :—

Thalictrum alpinum, L., ascends to 3250 feet on Glas Thulachan.

I should be glad of information respecting its growth on *dry* rocks. I think I have seen it on dry rock ledges with *Woodsia*.

T. Kochii, *Fries*.—The Rev. E. F. Linton sent plants so labelled from Fortingal, Mid Perth, to the Exchange Club in 1897 ; but the specimens were not sufficiently complete for Herr Freyn to report on them. I have collected material from the banks of Loch Tay this season which will, I trust, be sufficient for the purpose. The "Flora of Perthshire" does not assist us, as the Loch Tay plants are grouped under *T. minus*, L., as var. *montanum* and var. *majus*.

**Ranunculus Nathorstii*, A. Berl. (*R. acris*, var. *Nathorstii*).—I met with this plant many years ago on Ben Lawers ; but although I felt it was distinct from ordinary *acris*, it was not until 1897 that Herr Freyn identified it with the above ; and on the specimens I collected then and in 1898 he remarks that they offer a considerable range of variation, some from Ben Lawers being fairly typical, others are bracteate, as in *R. auricomus*, while others are hairy and large-flowered forms. One, also from Ben Lawers, is a very remarkable form, with a somewhat elongated or else præmorse rhizome covered with coarse hairs. As the beak of the fruit is of marked length, he considers it to belong to *Nathorstii*, although he had never seen specimens

with such large flowers as this, which was gathered at an altitude of 3500 feet. Taking the large flowers into consideration, one might suppose the plant of the Breadalbanes to be the high-alpine *R. stipatus*, *Jordan*; but this has fruits which end in a somewhat oblique and very short, scarcely hooked beak. The long curved fruit-beak distinguishes *R. Nathorstii*, f. *hirsuta*, from *R. tomo-phyllus*, *Jordan*, also. Judging from the material which I sent him, Herr Freyn thinks *R. Nathorstii* to be the boreal form of *R. vulgatus*, *Jord.* Individual plants with shortened rhizome appear to be the transition to *R. stipatus*, *Jord.*, and also to *R. acris*. In order to assist in clearing up these open questions I should be very grateful for specimens of *R. acris* from many localities, mountain and lowland, with rhizome, flowers, and well-developed fruit. Specimens from the Orkneys, Shetlands, and the Hebrides, as well as those from high altitudes, would be very much welcomed. I would forward them to Herr Freyn, and interesting results would most certainly be obtained. Herr Freyn thinks that some of the forms are geographically distinct, and that *R. Nathorstii*, which was first reported from Greenland, is excluded from the warmer localities. I also collected *Nathorstii* on Ben Heasgarnich, Creag-an-Lochain, and Ben Laoigh in Perthshire [and also on Aonach Mhor in Westernness, on Lochnagar, South Aberdeen; and on Ben Doireann, etc., in Argyll]. It is new to Britain as a variety.

var. Steveni (*Andrz.*) occurs in Glen Shee at 2000 feet, and as the forma *humilis* on Ben Lawers.

var. vulgatus (*Jord.*).—On Ben Lawers.

var. pumilus, *Wahl.*—The plant from Braeriach alluded to recently by the Rev. E. S. Marshall is not, I think, identical with the plant I recorded as *var. pumilus* from Corrie Sneachda on the Cairngorms. It will probably be found to belong to *Nathorstii*.

Caltha palustris, *L.*, *var. minor*, occurred at 2800 feet on Glas Thulachan. I saw a specimen rooting at the nodes, the *var. procumbens*, *Beck.*

Papaver dubium, *L.*—All the specimens from Perthshire seen by me are *var. Lamottei*.

Corydalis claviculata, *DC.* (*Capnoides claviculata*, *Druce*).—Luxuriant on thatched roofs this year near Lawers.

Cardamine pratensis, *L.*—I saw the true plant with sessile leaflets on Glas Thulachan; but *C. palustris*, *Peterm.*, with stalked leaflets, and usually with lilac flowers, is certainly the common Perthshire form. I saw it at 3200 feet on Ben Heasgarnich, and at 2600 feet in Isla [and at 3300 feet in South Aberdeen].

Draba hirta, *L.*, var. *rupestris* (Br.), appears to have become less frequent on Ben Lawers. I have it named as above because I do not see that it can be more than a variety of the Linnean *hirta*, although kept as a distinct species in the "Index Kewensis."

Erophila inflata, *Hook*, f., was found this year by my friend the Rev. W. O. Wait on the summit of Ben Lawers at 3990 feet.

Cochlearia micacea, *Marshall*.—On Ben Heasgarnich with *C. alpina*; the latter also on Creag-an-Lochain and Ben Laoigh.

Viola lutea, *Huds.*—I was rather surprised to find more particular attention was not given in the "Perthshire Flora" to the beautiful pansy which adorns the high rocks of Ben Lawers. Herr Freyn identifies "this splendid blue violet" with the var. *grandiflora*, Koch ("Syn.," 3rd ed., p. 76) = *V. lutea*, *Huds.*, a, *unguiculata*, var. *violacea*, Rouy. and Fouc., "Flore de France," vol. ii. p. 52. I have never seen specimens with quite such large flowers as the Lawers plant, some from Mickie Fell, Durham, being the nearest to them in size.

Cerastium vulgatum, *L.* (*C. triviale*, Link.), ascends to 3000 feet on Glas Thulachan, where I saw a long-petalled form, the var. *alpinum*, Koch; it also occurs on Ben Heasgarnich and Ben Laoigh.

C. alpinum, *L.*, var. *lanatum* (Lam.).—Sparingly (this year) on the slopes of Glas Thulachan up to 3110 feet. On Ben Heasgarnich. Plentiful on Ben Lawers.

var. *piloso-pubescentis*, Benth.—On the eastern side of Ben Lawers up to 3800 feet, and in the corrie of Ben Heasgarnich.

C. trigynum, *Vill.*—Watson gives this in the "Cybele" for Ben Lawers at 2700 feet, but I have never seen it there.

Stellaria graminea, *L.*, ascends to 1500 feet in Glen Shee.

Sagina subulata, *Presl.*—On the ascent of Ben Lawers, on nearly bare ground, at about 1500 feet.

Sagina Linnæi, *Presl.*—Abundant and luxuriant on Glas Thulachan up to 3000 feet. I have no notes of this occurring below 2000 feet [and have seen it as high as 3300 feet in South Aberdeen]. It is abundant by rills on the Clova tableland. *S. nivalis* and *Arenaria sulcata* were seen in their old stations on Ben Lawers.

Montia fontana, *L.*, as the var. *minor*, All., ascends to 2500 feet on Glas Thulachan.

(To be continued.)

EIGHTEENTH CENTURY RECORDS OF
SCOTTISH PLANTS.

Communicated by Professor I. B. BALFOUR, M.A., M.D., F.R.S.

JOHN HOPE, W.S., of Moray Place, Edinburgh, who died in 1895, bequeathed to the Royal Botanic Garden a number of botanical books, papers, and drawings which had belonged to his grandfather John Hope, who was Regius Keeper of the Garden from 1760-1781. The bequest, owing to the well-known litigation which Mr. Hope's will provoked, has only recently come into my care.

Amongst the MS. I find a small note-book containing a number of records of date 1764 and 1765 of stations for plants about Edinburgh and in other parts of Scotland. A list such as this of eighteenth century records has many features of interest, not only botanical, but also topographical, and may find a fitting place of publication in the pages of the "Annals of Scottish Natural History."

The writing of the MS. is not that of Dr. Hope, and I am not at present able to suggest who was the writer; but Dr. Hope has interpolated additional stations or queries on places in the book.

Upon the first page there is the heading, "A list of plants as they were collected and prepared during the year 1764, with ye place of growth." Dr. Hope has interpolated the words "in flower" after "plants" in the heading—an expression we must accept in its widest signification as used by botanists in the eighteenth century, and as referring to the sporiferous condition of Thallophytes as well as to the flowers of Spermaphytes. The list continues in calendar form from March 1764 until January 1765, when a couple of pages are blank; and the calendar recommences with the date 14th May, and goes on until 30th October 1765, under the new heading, "A calendar of plants as they were found and prepared in the year 1765." The first portion of the list is emphatically one of plants in the vicinity of Edinburgh. There are in it but a few records of stations far afield. The second portion of

the list has a much larger proportion of citations of localities distant from Edinburgh.

On the fly-leaf at the beginning of the book there appears, in Dr. Hope's handwriting, the following:—"List of plants growing in the neighbourhood of Edinburgh, collected in flower, 1765, as a sketch of the *Calendarium Florae* of Edinburgh." We must assume that 1765 in this is a slip for 1764-1765. The internal evidence seems to show that Dr. Hope was not the compiler of the list; but it is manifest that he had looked through it, made additions, and pointed out doubtful records.

The list is here transcribed verbatim and without changes in the spelling—which is not altogether uniform—or the nomenclature. Some of the entries are surprising. I have, however, made no comment, beyond indicating where interpolations have been made in a writing other than that of the original.—I. B. B.

A LIST OF PLANTS IN FLOWER AS THEY WERE COLLECTED AND PREPARED DURING THE YEAR 1764, WITH YE PLACE OF GROWTH.

March 1. <i>Tussilago farfara</i> .	By the water of Leeth down from the new well.
20. „ <i>petasites</i> .	By the water of Leeth up from the new well.
Aprile 6. <i>Fragaria sterilis</i> .	Opposite to the new well on the further side of ye mill burn.
<i>Ficaria verna</i> .	In the west Church Yard and St. Anns Yards.
7. <i>Alsine media</i> .	On the west side of the Castle hill by the road side.
<i>Ulex europaeus</i> .	A little below the new well.
<i>Lamium rubrum</i> .	Below the new well by a hedge near a village.
12. <i>Cochlearia officinalis</i> .	Upon the top of a wall at the back of the Cannongate.
<i>Arenaria saxatilis</i> .	At Duddingstown Craigs.
<i>Cerastium semidecandrum</i> .	At Do. by the road side.
14. <i>Leontodon taraxacum</i> .	By the sides of the hedges in the meadow and other places.
16. <i>Veronica hederifolia</i> .	Below the new well by a hedge near a village.

	<i>Caltha palustris</i> .	In the meadow and west end of the North Loch.
	<i>Thlaspi bursa-pastoris</i> .	In many places by road sides and tops of walls.
20.	<i>Cheiranthus cheiri</i> .	On the Castle-hill Rocks.
26.	<i>Chrysosplenium</i> op- positifolium.	Up from the new well below the Brea.
	<i>Geum rivale</i> .	Up from the new well.
	<i>Alchemilla vulgaris</i> .	Near the new well by the roadside.
28.	<i>Cardamine amara</i> .	Below the new well plentifully.
	„ <i>hirsuta</i> .	On Salisbury Craigs.
	<i>Draba verna</i> .	On Do.
	<i>Primula vulgaris</i> .	In the Kings Park.
	<i>Mercurialis perennis</i> .	In Do.
30.	<i>Primula veris</i> .	At the foot of the rock of Salisbury Craigs.
	<i>Ribes grosularia</i> .	On Salisbury Craigs, Kings Park, and the Castle hill.
	<i>Prunus spinosa</i> .	Kings Park and Duddingstown Craigs.
May	1. <i>Lychnis dioica</i> .	Above the new well.
	<i>Lamium album</i> .	Below the new well by the road-side.
	2. <i>Cardamine petrea</i> ? ¹	Salisbury Craigs.
	<i>Cerastium vulgatum</i> .	On the top of walls and many other places.
	<i>Myosotis scorpioides</i> .	Duddingstown Craigs.
	<i>Valeriana locusta</i> .	At Do. and among corns.
	4. <i>Statice armeria</i> .	At the back of Musselburgh and in other places by the sea-side.
	<i>Stellaria holostea</i> .	Salisbury Craigs.
	6. <i>Viola canina</i> .	Salisbury Craigs and Kings Park.
	<i>Oxalis acetocella</i> .	At Do.
	7. <i>Salix repens</i> , fem.	
	„ „ mas.	
	<i>Asperula odorata</i> .	Salisbury Craigs.
	8. <i>Salix arenaria</i> , fem.	
	„ „ mas.	
	<i>Juncus campestris</i> .	In the Kings Park.
	„ <i>pilosus</i> .	In Achindenny wood.
	„ <i>sylvaticus</i> .	In Do.
	<i>Cherophyllum</i> tem- ulum.	At the hermitage: frequent. ²

¹ The mark of interrogation is an addition in different writing, which is like that of Dr. Hope.

² This locality in Dr. Hope's writing.

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| 9. | <i>Cardamine pratensis</i> . | In the Hunting-bog. |
| | <i>Ranunculus hederaceus</i> . | In a marsh without St. Anns Yards at the Tirless. |
| 10. | <i>Anemone nemorosa</i> . | Achendinny wood. |
| | <i>Ranunculus auricomus</i> | In Do. |
| | <i>Ajuga reptans</i> . | In Do. |
| 11. | <i>Silene amoena</i> (at last agreed upon) | At the Petty cur by the roadside to Kinghorn. |
| 12. | <i>Ribes rubrum</i> . | In the Loch rill of Micklour, Perthshire. |
| 14. | <i>Orchis mascula</i> . | Achendinny wood. |
| | <i>Vaccinium myrtillis</i> . | At Do. |
| | <i>Lysimachia nemorum</i> . | At Do. |
| 15. | <i>Geranium molle</i> . | Castle-hill. |
| | <i>Orobanchus tuberosus</i> . | Arthurs Seat. |
| | <i>Tormentilla reptans</i> . | Salisbury Craigs. |
| | <i>Ranunculus Aquatilis</i> . | Leeth Links. |
| 16. | <i>Viola tricolor</i> . | Among corns and by waysides. |
| | <i>Lichen caninus</i> . | } In the Kings Park. |
| | „ <i>stellaris</i> . | |
| | „ <i>candellarius</i> . | |
| | <i>Polygala vulgaris</i> . | Salisbury Craigs. |
| | <i>Anthemis Cotula</i> . | By way sides. |
| | <i>Genista Angelica</i> . | At Essendis in the fir Park. |
| 17. | <i>Glechoma hederacea</i> . | On the south side of St. Anns Yard wall betwixt it and ye marsh. |
| | <i>Orchis morio</i> . | Collintown wood. |
| | <i>Fragaria vesca</i> . | On the Dean Burn Brea above the lowest millns. |
| | <i>Adoxa moschatellina</i> . | On Breds hill. Hermitage. ¹ |
| | <i>Geranium moschatum</i> . | At Leeth-walk by the wall side near ye new Garden. |
| 18. | <i>Pedicularis sylvatica</i> . | In the marsh near Dudingstown Loch. |
| | <i>Sysymbrium Nasturtium</i> . | |
| | <i>Prunus avium</i> . | In woods. |
| | <i>Veronica chamedrys</i> . | By the way sides in many places. |
| | „ <i>serpyllifolia</i> . | By Do. |
| | <i>Spartium scoparium</i> . | Collintown wood. |
| | <i>Acer Pseudo Platanus</i> . | Do. |
| | <i>Fraxinus excelsior</i> . | Do. |
| | <i>Corylus avellana</i> . | Do. — past the flower. |

¹ This in Dr. Hope's writing.

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| Senecio vulgaris. | In many places. |
| Ranunculus auri-
comus. | In Collingtown wood. |
| Crataegus oxyacantha. | On the water side below Roslin
a little above Mavis bank. |
| Rumex acetosa. | |
| „ acetosella. | At Craig leeth Quarry. |
| Menyanthes trifolia. | In the Hunting-bog. Lochend. ¹ |
| 19. Narcissus pseudo-nar-
cissus. | In low grounds below the Kirk-
town of Lethendie. |
| Myrica gale. | In a marsh west from the Kirk-
town. |
| Ranunculus acris. | In the Gray Friars Church yard. |
| Plantago medea. | At eas Houses near Dalkeeth. |
| Hyacinthus non-scrip-
tus. | Kings park. The hermitage,
abundant. ² |
| Salix fusca, mas. | |
| „ „ fem. | |
| Salix purpurea mas. | |
| Eriophorum polysta-
chion. | In the hunting-bog. |
| „ vaginatum. | In a marsh coming from Achin-
denny. |
| 22. Scirpus palustris. | In Dudingstown Loch. |
| Scleranthus annuis. | On walls and other barren
grounds. |
| Lotus corniculatus. | Kings Park. |
| Ranunculus repens. | In the Gray Friars Church yard. |
| Montia fontana. | At the sides of many marshes. |
| Bunium Bulbocastan-
um. | On Bredfoord hill, particularly
among Corns. |
| Plantago lanceolata. | Salisbury Craigs and other pas-
tures. |
| 23. Equisetum fluviatile. | Dudingstown Loch. |
| „ arvense. | In pastures. |
| „ limosum. | In Roslin wood. |
| Lolium perenne. | In Pastures. |
| Chenopodium Bonus
henricus. | |
| 24. Sedum acre. | Salisbury Craigs. |
| Ranunculus bulbosus. | Kings Park. |
| Erysimum officinale. | |
| Sinapis alba. | Among corns. |
| Conium maculatum. | Castle hill. |
| 25. Equisetum sylvaticum. | In a thicket up from Roslin. |

¹ In Dr. Hope's writing.² In Dr. Hope's writing.

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| | Pinguicula vulgaris. * | Pentland Hills. |
| 28. | Veronica becabunga. | |
| | Fumaria officinalis. | Among corns. |
| | Rumex digynus? an
scutatus. | At the Castle of Glamiss. |
| | Scrophularia vernalis. | At Kirkland, near St. Martin,
Perthshire, into an old wall. |
| 29. | Lapsana communis. | By the road side to the new
well at Prov. Drummonds
Park. |
| | Hieracium pilosella. | Salisbury Craigs. |
| | Arenaria rubra. | |
| | Trifolium repens. | In the Gallows Park. |
| | Ornithopus perpusil-
lus. | On the highway side a little be-
yond the Bridge of Earn. |
| 30. | Veronica serpyllifolia. | |
| | Hordeum murinum. | At Prov. Drummonds Park dyke
by the road side. |
| 31. | Ranunculus sceleratus. | In the North Loch plentifully. |
| | Alium ursinum. | Kings Park and below Roslin. |
| | Sanicula Europaea. | Kings Park and in woods. |
| June 1. | Linum catharticum. | Salisbury Craigs. |
| | Anthyllis vulneraria. | Do. |
| | Hieracium dubium. | On St. Andrews Breas. |
| | Turritis hirsuta. | Salisbury Craigs. |
| | Reseda luteola. | On the top of old wall opposite
to St. Anns Yards. |
| | Vicia sativa. | At the new well. |
| | Geum urbanum. | On the other side of the burn
betwixt the Dean Bridge and
lowest milns. |
| | Sherardia arvensis. | Salisbury Craigs. |
| | Nardus stricta. | Kings Park. |

(To be continued.)

NEW AND RARE SCOTTISH MOSSES.

By Dr. JAMES STIRTON, F.L.S., etc.

THE areolation of the leaves of mosses in a barren condition, as revealed by the microscope, has, more especially in later years, been extensively employed as an important factor in their determination. Even Wilson, author of the *Bryologia*

Britannica, a few years before his death—now more than thirty years ago—had set himself to determine mosses in a similar manner, and, as about a half of those so determined still hold their place, I am encouraged to persevere in the same direction. At any rate, in the interests of pure science, such work is now considered necessary, more especially as nearly a third of all the mosses in this country cannot, under ordinary circumstances, be secured in a fertile condition.

In what follows, all figures indicating dimensions have as their unit the micro-millimetre or the millionth part of a metre. This unit is now indicated by the Greek letter μ , which, however, is suppressed in this paper.

MOLLIA LAXULA.—Gregarious, dingy green, ultimately reddish ; stems generally simple from a quarter to a half of an inch long ; leaves nearly linear lanceolate, from a thin, pellucid, scarcely widened, plane margined, slightly clasping base, widely spreading when moist, circinato-incurved when dry and somewhat spirally contorted in the upper half ; margin entire, closely reflexed to near the apex, which is bluntish or rendered acute by several coloured, longish, pointed, smooth cells ; nerve yellow, ultimately reddish, tapering somewhat, prominent behind and papillose nearly throughout, traversed within by 3 to 5 largish, pellucid cellular tubes, ending just below apex or reaching it but not projecting beyond, breadth near base about 70 ; a thin section of the pagina shows a single row of pellucid cells, 7 to 12 diameter, surrounded, back and front, by a dense, opaque layer giving origin to large papillæ which cover both sides of the leaf, accordingly the general areolation is very obscure ; central basal cells pellucid, rectangular, attached, dimensions 35 to 50 by 8 to 13, ending transversely in an upward direction ; capsule erect, reddish, at first turbinate, at length slightly oblique and oblong on a longish red seta ; lid shortly rostrate, teeth 16, pale yellow, separate to the base, lanceolate, erect, not twisted but slightly incurved. Ben Lawers, 1864.

This moss was detected extruded here and there through a layer of *Brachythecium reflexum*. I do not care to advance anything further as to the constitution of the peristome, as I have only one capsule with perfect teeth.

MOLLIA SCAPHOIDEA.—Depresso-cæspitose, yellowish green ; stems mostly simple, occasionally dichotomously divided, from one-eighth to a quarter of an inch in height ; leaves minutely papillose, circinato-incurved in a dry state, slightly spreading and straight when moist, broadly ovate, shortly lanceolate, length about three times the greatest breadth, apex often bluntish, margin entire,

smooth, inflexed in the upper two-thirds, to the extent, in the middle of the leaf, of 35, deeply cucullate at the apex with frequently a thin horizontal band connecting the apical margins; nerve pale yellow then reddish, breadth near base, 70 to 90, tapering, smooth on the back and prominent, slightly excurrent in a stiff mucro, but not always; areolation at central base and considerably outwards pellucid with double thin walls, or presumably in two layers of cells, 18 to 32 by 10 to 16, smaller outwards, gradually lessening upwards and ending transversely, the slightly clasping portion occupying about one-fifth length of leaf; upper cells opaque but fairly distinct, 8 to 12 diameter. This moss can only be associated with *M. crispula*, but the differences are manifest.

There is a slight doubt as to the *habitat*, but it was either picked up somewhere in the Clyde basin or on Ben Lawers; more probably on the latter.

MOLLIA TERRENA.—Rather loosely tufted, dingy yellowish-green above, brownish-black below; stems from 1 to $1\frac{1}{2}$ inch long, simple, at times dichotomously branched; leaves loosely set, somewhat longer near and at apex, fragile, crisped when dry, widely spreading, even recurved when moistened, from a clasping, somewhat broader, pellucid base, broadly oblongo-lanceolate, apex rather suddenly and convexly narrowing to a broad blunt apiculus (breadth about 65), which is often serrulate; margin plane, but somewhat incurved near the apex; coarsely crenated by projecting cells of a single marginal row, the longer diameter of which is set transversely, also distantly but distinctly serrate nearly throughout; nerve narrow, breadth near base about 65, tapering, plane in front, slightly convex behind, ending below the summit of the broad apiculus; central basal cells pellucid, oblong, presumably in two layers, 35 to 50 by 10 to 14, smaller outwards as well as upwards where they end nearly transversely in the general areolation, which is composed of opaque, largish, bluntly quadrate cells, minutely papillose on both sides, 8 to 13 long.

On peaty earth, island of Harris, Outer Hebrides. This moss seems allied to *M. recurvifolia* (Tayl.), but the margins are not pellucid, etc.

BARBULA FERRUGINASCENS.—Densely tufted, of a lurid green, at length entirely of a rusty red colour; stems upright from a quarter to one-half of an inch long, sparingly branched; leaves closely set, slightly contorted when dry, erecto-patent, straight and stiff when moist, rather broadly ovate lanceolate, slightly acuminate; nerve yellow, then red, flattish in front, rounded and prominent behind, thickness about 50, breadth near base 60, nearly cylindrical, scarcely tapering, perhaps a little broader near the middle, excurrent shortly in a straight, stiff, blunt apex, generally tipped with a tawny, smooth,

pointed cell, the length of which varies from 10 to 18; a thin section of nerve shows a transverse row of 3 to 6 pellucid cells, each 9 to 18 across; margin closely and narrowly recurved, so closely that under the microscope it is impossible, in the majority of instances, to detect any chink, and the whole appears merely thickened behind; pagina below somewhat clasping, composed of pellucid oblong cells, 22 to 32 by 8 to 11, such cells ending gradually and transversely in dense opaque, obscure cells, rounded or bluntly quadrate, in longitudinal parallel series, 8 to 11 long, the whole surface in front and behind, as well as on the nerve, densely papillose. A thin section of the pagina shows a single row of small pellucid cells surrounded on either side by a dense layer, whence arise the papillæ, which, however, are absent in the sheathing portion. On the ground, Orkney, 1887.

I have described the structure of the leaf minutely because, with the exception of *B. Brebissoni*, I cannot recall another having such a margin which is practically thickened behind. Once seen, this moss has a peculiar *facies*, which would alone enable one to recognise it in the field.

GRIMMIA HALOPHILA.—Densely tufted, dark green above, dark brown or nearly black below, with rufous radicles sparingly interspersed; stems about 1 inch long, commonly fastigiato-ramose; leaves rather dense, erecto-patent when moist, appressed when dry, and only slightly contorted near apex, broadly lanceolate or ovate lanceolate, slightly acuminate, pagina more or less inflexed so as to render the leaf in front more or less acutely hollow, margin entire, broadly recurved nearly to apex; cells near central base oblong, 20 to 30 by 9 to 16, shorter outwards and upwards; general areolation obtusely quadrate in parallel longitudinal rows, large, 8 to 14 diameter, in single layer, not papillose; nerve strong yellow, then reddish, ultimately reddish throughout, solid, projecting behind, flattish in front, breadth near base 70 to 90, tapering and extruded in a longish tapering coloured acumen which is often as much as 120 long.

On the ground, "imbedded in sandy soil," seashore, island of Unst, Shetland, 1884.

This is evidently allied to *G. maritima*, although it differs from it in several essentials, as in the much larger areolation, in the strongly reflexed margin, longly excurrent nerve, etc. From *G. apocarpa* and all its varieties it differs in the areolation not being sinuous in any part of the leaf, long coloured acumen, etc.

GRIMMIA MARITIMA, *var. TRACHYPHYLLA*.—This variety has been found in many places on the west coast of Scotland, and was first gathered in North Uist, an island of the Outer Hebrides. It is characterised by the large tufts as well as generally by their rusty-red colour in the lower two-thirds; by the presence of large pellucid papillæ on the margins of the upper leaves, especially on the upper-

most third as well as on the back of the nerve in the same region. The nerve is also excurrent, at times longly so. The central basal areolation is also much longer than in the ordinary form. The most characteristic specimens were found at Taynuilt at a considerable distance from the sea, as well as near Loch Killisport.

BRYUM PARASEMUM.—Closely tufted; stems short, simple or occasionally branched; leaves rather closely imbricated, slightly narrowed at the base, broadly obovate, very concave, obtuse and rounded at summit; almost cucullate; nerve about 50 broad near base, tapering rapidly and not quite reaching the summit; margin entire, not recurved but plain, and not formed of narrower cells; very laxly areolated, cells not chlorophyllose so far as observed, with thin walls, oblong or bluntly rectangular, 30 to 50 by 15 to 22, of nearly the same size throughout, but a little smaller upwards, and rather more rhomboid.

In sandy hollows near Stevenston, Ayrshire, 1863. Although there are several under this section of the *Brya* with broad, hollow leaves, I cannot identify this moss with any. Wilson pronounced in its favour, but I cannot recall whether or not he gave a name to it. I rather think he waited to see whether fruit might be found. I have not been in the locality since.

ISOETHECIUM INTERLUDENS (*n. sp.*).—The other day I alighted on a small parcel of mosses which I had long reckoned as irretrievably lost. This parcel consists of five specimens of what the late Mr. Wilson, author of the *Bry. Brit.*, persisted in identifying with *Brachythecium glaciale*. As I dissented from this decision, I published, in 1865, a description of the moss under the name *Isothecium intermedium*, which I now change to *I. interludens*, owing to the former name having been previously given to a *Hypnum*, even although the moss referred to is now classified under the genus *Bryum*. As I have detected stolons in three of the specimens, such as are found in *Isothecium*, I have been induced to submit the leaves under the microscope, when additional corroboration of my former opinion has been obtained. The cells of the pagina are long, very narrow, nearly cylindrical, and quite distinct and detached from one another, while in the basal-alar spaces the cells are small, oval, yellow or reddish-brown and opaque, owing to the granular contents, both conditions exactly as in *Isothecium*. I may mention that the moss was found by the late Mr. A. M'Kinlay and myself on almost all our western mountains of any considerable elevation, as Ben Ledi, Ben Voirlich (by Loch Lomond), etc.; also on Ben Lawers.

The following is a rather fuller description:—

Stems erect, strong, reddish, fastigiately branched, branches often slightly arched; leaves straight, very seldom slightly secund, erecto-patent both in a dry and wet condition, concave, cordate

or broadly ovate rather suddenly, and longly as well as slenderly acuminate; margin plane or, in the specimen from Ben Lawers, narrowly recurved at times near the base, serrulate for the most part nearly throughout, occasionally nearly entire; nerve slender, at times bifurcate, reaching the middle of the leaf or a little longer.

This moss is much larger in every way than *I. myosuroides*, of a much larger habit, with larger leaves, equalling or even exceeding those of *I. myurum*, although of quite a different shape. It has also been found in Orkney.

There is still another moss approaching more nearly *I. myosuroides* than the above, with narrower leaves, which are, however, rather suddenly and longly acuminate, and not narrowing towards a point in a straight line as in *I. myosuroides*. To this I gave the name *I. subglaciale*.

The following is supplementary to the description given in 1865:—

Stems slender, long and straggling, procumbent, yellow, then reddish, irregularly and distantly, but here and there, fasciculato-ramose, branches straight or slightly incurved; stem leaves smaller, scattered, spreading, broadly ovate lanceolate, longly acuminate, nearly entire, margin plane, nerves short, at times apparently double; branch leaves narrower, ovate lanceolate, also acuminate, nerved half way, serrulate nearly throughout. Areolation as in *I. interludens*, viz. general areolation 25 to 40 by 4 to 5, separate and distinct. Slender flagelliform shoots, with small scattered leaves, are frequently seen. No fruit has ever been found on either moss.

ISOETHECIUM SYMMICTUM.—In depressed or ascending, yellowish-green tufts, here and there stoloniferous; stems nearly simple or fastigately branched, branches mostly simple, often slightly curved; leaves crowded or even imbricated when dry, slightly spreading when moist, concave, broadly ovate, rather longly acuminate, margin plane, often slightly incurved above, serrulate in upper third, at times nearly entire, striate or even sulcate, nerve yellow, at length orange-red, stout near base, rapidly tapering and reaching beyond the middle; bases of leaves composed of two or three transverse rows of reddish-brown oval cells, 16 to 22 by 8 to 12, which extend right across with scarcely any alar cells, properly so called; general areolation long, fusiform, sharply pointed, attached, 55 to 80 by 4.5 to 6. The cells immediately above the coloured base are shorter than the others above them, and somewhat oval or bluntly fusiform. Ben Lawers, 1864. The areolation of the leaf differs widely from that of the other species of *Isoethecium*, and resembles that of some *Brachythecia*, but the basal areolation and the presence of stolons determined in favour of association with *Isoethecium*, while the fastigate branching, and the slightly curved branches themselves, strengthen this opinion.

HYPNUM RECURVULUM.—In small, prostrate, densely caespitose tufts; stems irregularly, often fastigiately branched, branches incurved, radiculose; leaves appressed when dry, erecto-patent when moist and somewhat recurved, broadly ovate, acute, apical somewhat acuminate; nerve strong, continuing to the apex or ending just below it, breadth near base 65, scarcely tapering upwards, often somewhat broader in the middle of the leaf, margin broadly reflexed from base to near apex, where it is plane and often slightly serrulate, but entire elsewhere. The reflexed portion of margin in the middle is as much as 35 broad, and often shows on it a narrow deep sulcus. The ordinary leaf may be said to be about twice as long as the greatest breadth, or about 1 by $\frac{1}{2}$ mm. Areolation near central base, oblong, 16 to 22 by 11 to 14, colourless, upwards and outwards smaller but still large, bluntly quadrate, 10 to 16 by 8 to 12, and fully chlorophyllose throughout. On boulders near the sea-shore, Largs, Ayrshire, 1869.

This moss, at first sight, has much the size and appearance of *H. catenulatum*. I cannot associate it with any except perhaps *H. fluviatile*, but the differences are manifest.

HYPNUM AMÆNUM.—Older stems prostrate, wiry, nearly leafless; growing stems ascending, irregularly and sparsely branched, branches nearly erect, yellowish-green above, brown below; lower leaves small and very concave, enlarging upwards, disposed pretty thickly and equally around the stem, spreading slightly but often imbricated, especially when moistened, from a broad, almost cordate base, shortly and convexly ovate, shortly and sharply apiculate, concave, striated, and even sulcated, margin plane, finely serrated, especially in the upper third, serratures formed by the sharp prominent extremities of cells; nerve with a breadth near base of 60, tapering quickly and reaching the middle; alar spaces decurrent, large, well defined, composed of hexagonal cells with thickish walls, very variable in size, 20 to 50 by 10 to 25. These cells are at first colourless, but become reddish-brown, the nerve also becoming yellowish. General areolation composed of cells very large and long, fusiform, somewhat undulating, with acutely pointed extremities, and in close apposition, pellucid, 65 to 100 by 7 to 10. Only male inflorescence has been detected, enclosed in very compact, bluntish, oval buds, situated in the axils of the lower leaves; leaves very blunt, with broader, opener areolation, often nerveless, especially those next the antheridia. Ben Lawers, 1864.

I cannot reconcile myself to the identification of this moss with any of the forms of *H. palustre*, nor even with the variety *Mackayi* of *H. eugyrium*. The areolation is of a different construction, besides, the cells are twice as long as well as twice as broad. There are other differences. In this respect also it differs from *H. molle*

(Dicks.), to the general appearance of which it bears a considerable resemblance.

PTEROGONIUM GRACILE, *var. PUNCTELLUM*.—In all, or nearly all, the numerous specimens of this moss that have been gathered, more especially in the West of Scotland, large pellucid papillæ have been discovered on the back of the leaf, visible even in the field by the aid of a Coddington lens. These papillæ are situated especially along the track of the nerve, but are also seen scattered over the rest of the leaf. They are pellucid, bluntish, incline somewhat forwards towards the apex of the leaf in the manner of serratures, and vary in height from 4 to 8. As I have not detected these papillæ on the specimens I possess from Professor Schimper, nor on the single specimen from Cornwall, while works on the subject I have seen speak of the back as smooth and shining, I have determined to separate the Scottish moss from the rest. As I cannot, however, satisfy myself that there is sufficient evidence in other directions to warrant a separation of this as a species from the other, I have constituted it a variety as given above.

Similarly, I have detected on nearly all Scottish specimens of *Hypnum crassinervium* a nodule on the back of the leaf corresponding to that seen in a similar situation in *H. illecebrum*; and what is more, this nodule is seen much more frequently in the former than in the several specimens I possess of the latter. At times two such nodules may be detected in close proximity.

It may be as well, meanwhile, to give expression to this peculiarity, not hitherto noticed, by calling this variety *noduliferum*.

GLASGOW, 14th April 1900.

ZOOLOGICAL NOTES.

The Black Rat in Orkney.—Mr. Angus Buchanan of Paisley, an Orcadian, has received a Black Rat (*Mus rattus*), or “Blue Rat” as it is popularly known in the islands, from South Ronaldshay, and has presented the specimen to the Paisley Museum. This example is a female, is 7.5 ins. in length and weighed 7 oz. 8 drs., and is thus above the average in size. The description of the colour of this species in Bell’s “British Quadrupeds” appears to me to be based upon English specimens, while Scottish specimens have not been examined—a very common thing in natural history works. The description of this Orkney specimen is as follows:—The fur long, shorter on the forehead; the colour of the head and back slate black, on the back mixed with long white hairs; the hairs on the back darker at their tips, and leaden or slate coloured towards their

base; on the under surface the fur is slate or light leaden colour. Two Renfrewshire specimens in the Museum, taken at the harbour on the White Cart, Paisley, are velvet black on their upper parts and light ash below. The hair on both these Rats is very fine, and contrasts with the long, rough appearance of the Orkney "Blue Rat."—J. M. B. TAYLOR, Free Museum, Paisley.

Remarkable Flocking of Starlings to Cramond Island.—For several years past, in the autumn and winter months, large flocks of Starlings have been in the habit of roosting in a small plantation of dwarf Scotch firs on Cramond Island. Last year, however, their numbers exceeded anything previously seen, and the coming and going of the Starlings to their island home excited general attention and much interest in the neighbourhood. The birds seemed to have some gathering-place farther inland, and passed overhead at night generally in one large flock, and the noise of their wings was like the first sweeping blast of a storm of wind. No matter what the weather was, they made their nightly trip across the waters of the Firth; and I have watched them battling against an easterly gale, when they had to fly so low as to nearly touch the water, and some weaker ones were driven back to shore. In the winter mornings they appeared to leave in separate bands, and each to make for different feeding-grounds. On Saturday, the 27th January, I walked over to the island to watch the arrival of the birds. Mr. Peter Hogg, who resides on the island, accompanied me to the wood, and we got under cover at 4.30 P.M., about the time the first Starlings were due to arrive. The state of the branches of the trees and the droppings of the birds on the ground afforded unmistakable evidence of the immense numbers frequenting the spot. Soon after, the first batch of birds arrived and settled in the far end of the plantation as close as they could perch, and began their peculiar whistling chatter, making a din not easily described. Another large flock then appeared, and with a swoop they settled down near the others, until it seemed as if the trees could not hold any more. Every few minutes there was a succession of smaller flocks that swooped down in a similar manner until the whole plantation was one living mass of birds, some of which perched within touching distance of our hands. The birds all came from the south shore, and the large flocks which I had been in the habit of watching were only part of the colony. After the Starlings had all arrived we emerged into the open. It seemed a pity to disturb them, but a shot fired into the air raised such a cloud of birds that in trying to estimate their number I could not say Mr. Hogg's words seemed an exaggeration when he said there were "millions of them."

Even more remarkable than the vast numbers of Starlings frequenting the island during the winter months, is the large numbers which have continued to flock there during the breeding

season. Up to the 31st of May I have watched them regularly, and a few dates given show the times of their daily migration.

8th March.—Starlings crossed over at 6 P.M.

7th April.— " " " 7 P.M.

17th April.— " " " 7.15 P.M.

6th May.—Between 8 and 9 P.M. the Starlings came over from the island, having evidently been disturbed, but went back again.

7th May.—Starlings in large number at 7.15 P.M. Mr. Hogg said they left the island that morning at 5 A.M.

22nd and 23rd May.—Crossed at 8 P.M.

25th May.—Starlings crossed at 9 P.M. (clear night).

28th May.—Between 8.10 and 8.45 nine different flocks passed overhead.

29th May.—Mr. Hogg told me he saw the Starlings leaving the island at 20 minutes past 3 in the morning.

30th May.—Starlings seen crossing as late as 9.15.

31st May.—Starlings were passing over to the island between 8.30 and 9 P.M.

In connection with the foregoing it may be interesting to state that my father remembers of the first pair of Starlings coming to this neighbourhood. They nested in the ruins of old Barnboughe Castle some forty years ago, and their appearance at that time created much interest.—CHAS. CAMPBELL, Dalmeny Park.

Goldfinch in Clackmannanshire.—On the 19th of May last (1900) I had the pleasure of watching a Goldfinch (*Carduelis elegans*) bathing, within a few yards of me, in a ditch in Clackmannanshire. It was apparently a male, and had, I have little doubt, a mate on her nest not far off.—WILLIAM EVANS, Edinburgh.

Tree Sparrow in Midlothian.—About the 14th or 15th of February last, while the second heavy fall of snow was still lying, Mr. Nisbit, the farmer at Kingsknowes, was shooting Sparrows, which with odd Finches and Starlings congregated at a potato-pit. Among the Sparrows he had obtained I noticed one which seemed to me to differ from the others, and on examining it I found it to be a Tree Sparrow (*Passer montanus*).—EDWIN ALEXANDER, Slateford.

Red-backed Shrike in East Lothian.—I saw a fine male Red-backed Shrike (*Lanius collurio*) near Whitekirk Church on the afternoon of the 9th May. He was very tame, and I watched him at close quarters for some time. He was mobbed for a short time by a couple of Chaffinches.—CHRISTOPHER C. TUNNARD, Tynninghame.

Chiffchaff near Edinburgh.—On the evening of 30th May, I twice heard the unmistakable notes of the Chiffchaff (*Phylloscopus rufus*) at Dreghorn, a suburb of Edinburgh. I have never before detected this bird in the Edinburgh district, and Mr. William Evans

informs me that his only records for Midlothian are :—Polton, May 1876 ; Colinton Dell, 13th July 1884 ; and Arniston, 12th May 1898.—W. EAGLE CLARKE.

Owls in Islay.—Dr. Gilmour mentions in the January number of the “Annals of Scottish Natural History” the capture of a Long-eared Owl (*Asio otus*) in the south of Islay, and is under the impression that it is a rare bird in the island. While I am happy to say that I know of no instance of any Owl being procured in Islay, yet, having had a home there for twenty-three years, I am glad to be able to state that in the north, in the Forest of Kilchomon, the Long-eared Owl is of almost daily occurrence. It breeds annually close by where I reside, and I see the birds mousing on the lawn. I believe that but for these Owls we should be much troubled with the Short-tailed Field Mouse or Vole (*Microtus agrestis*). The Short-eared Owl (*Asio accipitrinus*) arrives about the end of October very regularly, and in considerable numbers. Of the remaining Owls which were once abundant in Scotland, but which folly and stupidity have now rendered almost rare, I have only seen in Islay one Brown Owl (*Syrnium aluco*) and one Barn Owl (*Strix flammea*), and, strange to say, the latter was an albino. Islay may claim at least one specimen of the magnificent Snowy Owl (*Nyctea scandiaca*), as a gamekeeper once told me that he had trapped an example many years ago in this parish.—R. SCOTT SKIRVING, Foreland.

Scops Owl in Shetland.—On the 15th of May I received for identification a wing and a leg of a Scops Owl (*Scops giu*) which had been captured on the island of Foula. Mr. Francis Trail, who kindly sent the remains, informed me that the bird was first seen at the end of April, when a woman discovered it in her barn. Here it was eventually captured and kept in confinement, but soon died. The occurrence of this species in so remote an island is remarkable, and is of special interest because the Scops Owl has not hitherto been known to visit the Shetland Islands. The recorded instances of this Owl in Scotland are very few in number. It was obtained in Sutherland in May 1854 ; a pair were shot at Scone in May 1864 ; one was found dead near Kintore in September 1891 ; and one was captured alive at North Ronaldshay, Orkney, in June 1892, as recorded in this magazine (“Annals,” 1893, p. 71).—W. EAGLE CLARKE, Edinburgh.

Iceland Falcon in Skye.—A young Iceland Falcon (*Falco islandus*) was sent for preservation to Messrs. Macleay of Inverness on the 15th of February, which had been obtained near Carbost, Skye. It was apparently a bird of last year.—T. E. BUCKLEY, Inverness.

Ruff in Orkney.—On the 2nd of September last year, when staying at the Dounby Hotel, Orkney, I was handed a Ruff and

Reeve (*Machetes pugnax*) in the flesh by Mr. J. Allan Milne of Edinburgh, who had shot them a few minutes previously. The birds were first flushed on the shores of the Loch of Sabiston, but they rose out of range. On his way back to the inn the pair flew past Mr. Milne quite close, who then fired and dropped both birds. The occurrence is noteworthy, as I believe it constitutes the first satisfactory record of this bird being obtained in the Orkney Islands.—T. R. CANCH, St. Andrews.

[A Ruff was obtained at Netherbrough, Harray, on the 21st of September last, by Dr. C. Donald of Edinburgh. It has previously been recorded for Orkney, and is probably a regular visitor in small numbers during migration.—EDS.]

Little Auk at Bo'ness.—On 31st March a boy brought me a Little Auk (*Mergulus alle*) which he picked up on the shore near Bridgeness; and later in the day I found a second specimen farther east. In 1895 I found one at Abercorn on 25th January, and again in 1897 I picked up three at the same place on 4th February.—ROBERT GODFREY, Edinburgh.

Common or Ringed Snake in Renfrewshire.—On the 21st April 1900 a fine specimen of the Common Snake, or Ringed Snake (*Tropidonotus natrix*), was killed in Newton Woods, Abbey, Renfrewshire. This specimen was presented to the Paisley Free Museum by Sergeant-Major M'Kimmond. The specimen measures $24\frac{1}{4}$ inches in length, and has been placed in the Museum among the British Reptiles. Can you or any of your readers say anything about the occurrence of the Ringed Snake in Scotland? I have found no mention of it being got in Scotland in any natural history literature referring to Scotland. The Adder is general in Renfrewshire, and in the same wood the Blind-Worm has been taken, but this is the first authentic capture of the Ringed Snake.—J. M. B. TAYLOR, Curator, Free Museum, Paisley.

[The Ringed Snake is not indigenous in Scotland. It is quite a common pet, however, and many examples escape and live at large, and it is possible that the species may thus in time become established in Northern Britain. We have examined many such escapes obtained in or near Edinburgh.—EDS.]

Electric Ray or "Torpedo" in the Moray Firth.—In April last an Electric Ray (*Torpedo nobiliana*) weighing 14 lbs. was captured in the Moray Firth. The man who first handled it received rather a severe shock. This fish is decidedly rare in Scottish waters, and we hope to obtain some further particulars of so interesting a capture. The specimen is now in the Museum attached to the Scottish Fishery Board's hatchery at Nigg.—EDS.

Eledone cirrosa in West Lothian.—After a heavy gale at the beginning of October last year, I found on the 4th of that month a

specimen of this large Octopus alive on the shore in the bay to the east of Blackness Castle. I had previously seen a dead individual of this same species in the same locality on 28th October 1898, also after a heavy gale.—ROBERT GODFREY, Edinburgh.

Platyarthrus hoffmanseggii, Brandt, in Fife.—On 14th June (1900) I had the good luck to find this rare terrestrial Isopod in some numbers in nests of the common ashy-black ant, *Formica fusca*, under stones on a sunny bank between Inverkeithing and St. David's, Fife. Like a number of other creatures that live in ants' nests, it is white and blind. The only previously recorded locality for this little "Woodlouse" in Scotland seems to be Banffshire, where it was found by Thomas Edward. It forms an interesting addition to Mr. Thomas Scott's List of "The Land and Fresh-water Crustacea of the District around Edinburgh" ("Proc. Roy. Phys. Soc.," 1890-91).—WILLIAM EVANS, Edinburgh.

On the Occurrence of *Diphyllbothrium stemmacephalum*, Cobbold, in the Intestines of a Porpoise.—A Porpoise (*Phocaena communis*) was recently cast up on the beach at Bay of Nigg, near Aberdeen. On making an examination of the viscera of this Cetacean, several specimens of a Cestode were observed, but it is doubtful if any of them were perfect. The anterior ends of the specimens are extremely attenuated, and the head is very small. Only two or three, however, have the head intact. Though the anterior end is very attenuated, the rest of the animal is of the usual "tape"-like form—a form which has given to these creatures the name of *tapeworms*. The two largest of the specimens, after having been for some time immersed in a saturated solution of corrosive sublimate, measured each eight feet in length, with an average width of nearly half an inch. The intestines of the Porpoise were in one or two places considerably distended by the crowding together of the Cestodes, and, one would fancy, must have caused more or less discomfort to their unfortunate host. Only the one kind of Entozoon was observed, and it agrees so well with Dr. Cobbold's description of *Diphyllbothrium stemmacephalum* that there can be no doubt about it being that species. Sexually-mature tapeworms do not appear to be very plentiful in the Cetacea, at least as regards number of species, though individually they may be more common. Dr. Cobbold, in his "Treatise on the Entozoa of Man and Animals," published in 1879, mentions only two species—the one referred to above, and *Tetrabothrium triangulare*, Diesing, found in *Delphinus rostratus*.

Diphyllbothrium stemmacephalum was described by Dr. Cobbold in the "Transactions of the Linnean Society," vol. xvii. p. 167. He also gives a short description of the species with three figures in the text in the "Treatise" just referred to, and states that four of the

specimens obtained by him from the Common Porpoise "measured, respectively, from 7' to 10' in length;" our larger specimens would therefore, when compared with those of Dr. Cobbold, appear to be of a fairly average size.—THOMAS SCOTT, Aberdeen.

BOTANICAL NOTES AND NEWS.

Euphrasias from the Isle of Stroma.—The following are the names given by Professor Wettstein to specimens gathered in Stroma by Miss Geldart:—*E. foulaensis*, Townsend, from three localities; *E. Rostkoviana*, Hayne, "forma fere eglandulosa," from four localities; and *E. Rostkoviana*, Hayne, from two localities. *E. latifolia* must be struck off, as the specimens prove not to belong to that form.—ARTHUR BENNETT.

Scottish Sphagna.—In Mr. Horrell's "Monograph of the European Sphagnaceæ," now appearing in the "Journal of Botany" (see Current Literature, p. 191), the following species and varieties are recorded from Scotland:—*S. fimbriatum*, Wils., var. *tenue*, Grav., in the form *submersum*, Roell., from Islay; *S. Girgensohnii*, Russ.; *S. Warnstorffii*, Russ., var. *purpurascens*, Russ., Ben Lawers (*Ewing*); *S. rubellum*, Wils., Islay (*Gilmour*); *S. fuscum*, Klinggr., Jura (*Ewing*); *S. acutifolium*, Russ. and Warnst., var. *pallescent*, Warnst., Jura (*Ewing*), vars. *versicolor*, Warnst., and *viride*, Warnst., Islay (*Ley*).

CURRENT LITERATURE.

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—April-June 1900.

[The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors will have access to the sources of information undermentioned.]

ZOOLOGY.

WHITE CATTLE: AN INQUIRY INTO THEIR ORIGIN AND HISTORY. By R. Hedger Wallace. *Trans. Nat. Hist. Soc. Glasg.*, vol. v. (N.S.) part iii., 1898-99, pp. 403-457 (March 1900).

NOTE ON THE COMMON HEDGEHOG (ERINACEUS EUROPEUS, LINNÆUS) AND ITS SUB-SPECIES OR LOCAL VARIATIONS. By G. E. H. Barrett-Hamilton. *Ann. and Mag. Nat. Hist.* (7), vol. v. pp. 360-368 (April 1900).—New sub-species (*occidentalis*) described from a specimen obtained at Innerwick, Haddingtonshire.

NARRATIVE OF A CRUISE IN LOCH FYNE, JUNE 1899. By John Paterson and John Renwick. *Trans. Nat. Hist. Soc. Glasg.*, vol. v. (N.S.) part iii., 1898-99, pp. 366-378, pls. xi. and xii. (March 1900).—Notes on the Birds and Land-Shells are included.

ORNITHOLOGICAL NOTES FROM SHETLAND. By T. Edmondston Saxby. *Zoologist* (4), vol. iv. p. 281 (June 1900).—Notes on Buffon's Skua [the first authentic record for the Islands], Blackbird [resident, and breeding], and Starling in Unst.

ON THE OCCURRENCE OF THE LESSER WHITETHROAT (*SYLVIA CURRUCA*) IN THE OUTER HEBRIDES, WITH REMARKS ON THE SPECIES AS A SCOTTISH BIRD. By Wm. Eagle Clarke, F.L.S., etc. *Proc. Roy. Phys. Soc. Edin.*, vol. xiv. part ii. pp. 158-162.

HERONRIES, PAST AND PRESENT, IN THE CLYDE FAUNAL AREA. By Hugh Boyd Watt. *Trans. Nat. Hist. Soc. Glasg.*, vol. v. (N.S.) part iii., 1898-99, pp. 378-398 (March 1900).

ON THE OCCURRENCE OF THE ASIATIC HOUBARA (*HOUBARA MACQUEENII*, GRAY AND HARDWICKE) IN SCOTLAND. By Wm. Eagle Clarke, F.L.S., etc. *Proc. Roy. Phys. Soc. Edin.*, vol. xiv. part ii. pp. 162-163.

NOTES FROM SOUTH-WEST SCOTLAND DURING 1899. By A. A. Dalglish, F.E.S. *Ent. Record*, vol. xii. pp. 104-106 (April 1900).—These notes relate entirely to Lepidoptera.

DISTRIBUTION OF *AMORPHA POPULI* IN WESTERN SCOTLAND. By A. A. Dalglish. *Ent. Record*, vol. xii. pp. 135-136 (May 1900).—Localities given for the Clydesdale district.

DISTRIBUTION OF *TRICHIURA CRATÆGI*. By J. C. Haggart. *Ent. Record*, vol. xii. p. 166 (June 1900).—Refers to a single record many years ago in the Galashiels district.

NOTES ON THE FUMEIDS, WITH DESCRIPTIONS OF NEW SPECIES AND VARIETIES. By T. A. Chapman, M.D., etc. *Ent. Record*, vol. xii. pp. 122-126 (May 1900).—*Fumea scotica*, a new species (?), described from Rannoch and Sutherlandshire.

OCCURRENCE OF *XENOLECHIA ÆTHIOPS*, WESTW., IN SCOTLAND IN APRIL. By Eustace R. Bankes. *Ent. Mo. Mag.* (2), vol. xi. pp. 132-133 (June 1900).—Three specimens taken by Mr. J. R. Malloch, at Bonhill, Dumbartonshire, on 21st April last. These specimens are supposed by the author of this note to be the first taken in Scotland, but he has evidently overlooked the record given by Mr. Wm. Evans in this magazine for the year 1897 (p. 107—*Lita æthiops*, "Common on burnt heather, Bonaly Hill, Pentlands, 13th May 1895").

DIPLODOMA MARGINEPUNCTELLA, STPH., IN DUMBARTONSHIRE. By Eustace R. Bankes. *Ent. Mo. Mag.* (2), vol. xi. p. 132 (June 1900).—Specimen captured by Mr. J. R. Malloch at Bonhill, Dumbartonshire, in June 1898.

DRAGON-FLY SEASON OF 1899. By W. J. Lucas, B.A., F.E.S. *Entomologist*, vol. xxxiii. pp. 137-143, pl. iv. (May 1900).—A number of Scottish records are given in this paper.

SOME OLD RECORDS OF THE OCCURRENCE OF CERTAIN DRAGON-FLIES IN SCOTLAND. By Kenneth J. Morton, F.E.S. *Ent. Mo. Mag.* (2), vol. xi. pp. 108-110 (May 1900).

ÆSCHNA CÆRULEA IN ROSS-SHIRE. James J. F. X. King. *Ent. Mo. Mag.* (2), vol. xi. p. 136 (June 1900).—Female taken at Loch Rosque, near Loch Maree, on 8th July 1890. Stated to be so far the most northerly record for the species in Britain.

AN EXTRAORDINARY MELANIC VARIETY OR ABERRATION OF ENALLAGMA CYATHIGERUM, CHP. By Robert M'Lachlan, F.R.S., etc. *Ent. Mo. Mag.* (2), vol. xi. pp. 110-111 (May 1900).—On a male specimen taken by Mr. K. J. Morton in Glen Lochay in July 1898.

AGRION PUELLA, L., IN SCOTLAND. By William Evans. *Ent. Mo. Mag.* (2), vol. xi. p. 88 (April 1900).—Specimen taken near Roslin in June 1896.

NOTES ON CERTAIN DIPTERA OBSERVED IN SCOTLAND DURING THE YEARS 1898-99. By Col. J. W. Yerbury, late R.A., F.Z.S., etc. *Ent. Mo. Mag.* (2), vol. xi. pp. 84-87 (April 1900).—Concludes a paper commenced in the March number, and gives notes on *Cordylura rufimana*, Mg., *Pogonota hircus*, Ztt., *Spathiophora hydromyzina*, Fln., *Trichopalpus punctipes*, Mg., *Ædoparea buccata*, Fln., *Limnia lineata*, Fln., and *Calobata stylifera*, Lw.

A FEW LOCALITIES FOR CERTAIN PSYCHODIDÆ, ETC. By James J. F. X. King. *Ent. Mo. Mag.* (2), vol. xi. pp. 135-136 (June 1900).—Refers to specimens captured at Aviemore and Guisachan, Inverness-shire.

LAPHRIA FLAVA, L., IN INVERNESS-SHIRE. By William Evans. *Ent. Mo. Mag.* (2), vol. xi. p. 87 (April 1900).—Refers to a male captured close to Loch Gamhna, Rothiemurchus, on 17th June 1893.

LAPHRIA FLAVA, L., IN SCOTLAND. By E. N. Bloomfield. *Ent. Mo. Mag.* (2), vol. xi. p. 87 (April 1900).—Refers to a previous record of two examples from Kincardine.

NOTES ON LOXOCERA. By W. Armston Vice. *Ent. Mo. Mag.* (2), vol. xi. pp. 115-116 (May 1900).—Several Scottish records given.

NOTES ON SOME CRUSTACEA FROM FAIRLIE AND HUNTERSTON, FIRTH OF CLYDE. By Thomas Scott, F.L.S., etc. *Trans. Nat. Hist. Soc. Glasg.*, vol. v. (N.S.) part iii., 1898-99, pp. 346-355 (March 1900).

BRITISH AMPHIPODA: FAMILIES PONTOPOREIDÆ TO AMPELISCIDÆ. By Canon Norman, M.A., etc. *Ann. and Mag. Nat. Hist.* (7), vol. v. pp. 326-346 (April 1900).—A large number of Scottish localities are given for the various species here treated of.

ADDITIONAL RECORDS OF SPIDERS AND OTHER ARACHNIDS FROM THE EDINBURGH DISTRICT. (Second Instalment.) By George H. Carpenter, B.Sc., and William Evans, F.R.S.E. *Proc. Roy. Phys. Soc. Edin.*, vol. xiv. part ii. pp. 168-180.—A list of twelve additional species of Araneidea, two of Phalangidea, and two of Chernotidea; and additional localities for species already recorded.

THE COLLEMBOLA AND THYSANURA OF THE EDINBURGH DISTRICT. By George H. Carpenter, B.Sc., and William Evans, F.R.S.E. *Proc. Roy. Phys. Soc. Edin.*, vol. xiv. part ii. pp. 221-266, pls. v.-viii.—Includes fifty-nine species of Collembola, of which seventeen are new to Great Britain, and four species of Thysanura.

CONODONTS FROM THE CARBONIFEROUS LIMESTONE STRATA OF THE WEST OF SCOTLAND. By John Smith. (With notes on the Specimens, and Descriptions of Six New Species, by George Jennings Hinde, Ph.D., F.G.S.), *Trans. Nat. Hist. Soc. Glasg.*, vol. v. (N.S.) pl. iii., 1898-99, pp. 336-346, pls. ix. and x. (March 1900).

BOTANY.

POTAMOGETON RUTIDUS, WOLFG., IN BRITAIN. By Arthur Bennett, F.L.S. *Journ. Bot.*, 1900, p. 65.—Notes the first certain occurrence (from Staffordshire) of this in Britain, and refers to Mr. Bennett having what may be this from Orkney.

SCHÆNUS FERRUGINEUS. By James Brebner. *Journ. Bot.*, 1900, p. 87.—Records that the species has disappeared from beside Loch Tummel, where he discovered it, in plenty, in 1884 as an addition to the British flora.

AMBLYSTEGIUM COMPACTUM IN BRITAIN. By H. N. Dixon, M.A., F.L.S. *Journ. Bot.*, 1900, pp. 175-182.—Treats fully of the discovery and true nomenclature of a moss found, new to Britain, in 1899 by Mr. Dixon at Durness and near Inchnadamph, in Sutherland, and states that it has proved to be *A. compactum*, C. M. Aust., and identical with *Brachythecium densum*, Juratz., of Europe.

THE EUROPEAN SPHAGNACEÆ (AFTER WARNSTORF). By E. Charles Horrell, F.L.S. *Journ. Bot.*, 1900, pp. 110-122, 161-167, 215-224.—Is a monograph of the genus in Europe, as based on the work of Dr. Warnstorf. It is preceded by a good bibliography of the genus since 1880.

REVIEWS.

A TREATISE ON ZOOLOGY. Edited by E. Ray Lankester, M.A., LL.D., F.R.S. Part III. THE ECHINODERMA. By F. A. Bather, M.A. Assisted by J. W. Gregory, D.Sc., and E. S. Goodrich, M.A. (London: Adam and Charles Black, 1900.)

Although the book under consideration forms the third part of the treatise, yet it is the first volume issued of what will undoubtedly prove to be one of the most important works on Zoology that has ever been published. It may be termed the "Oxford Natural History," for the distinguished editor and the various well-known authors of the series are graduates of that illustrious university.

The general aim of the treatise is, we are told, "to give a systematic exposition of the characters of the classes and orders of the animal kingdom, with a citation in due place of the families and chief genera included in the groups discussed." And "the main purpose of the Editor has been that the work shall be an independent and trustworthy presentation, by means of the systematic survey or taxonomic method, of the main facts of Zoology, or, to speak more precisely, of Animal Morphology."

In the volume before us, written chiefly by Mr. Bather, of the Natural History Museum, a recognised specialist on the Echinoderma, the Editor's ideal is fully realised. The volume presents us with a comprehensive and scientific account of the general features of the Phylum, and of the structure and classification of its various sub-divisions; and the illustrations, which are numerous and excellent, are chiefly original.

The treatise is to be completed in ten parts, and among the other authors concerned in their production are Professors Poulton, Weldon, Benham, and Minchin; and Messrs. G. C. Bourne and G. H. Fowler.

A BOOK OF WHALES. By F. E. Beddard, M.A., F.R.S. With forty illustrations by W. Sidney Berridge. (London: John Murray, 1900.)

Mr. Beddard's "Book of Whales" forms a new volume of Mr. Murray's Progressive Science Series—a series which is to comprise works on every branch of science.

The book presents us with a general work on the Cetacea, which

while being reasonably popular loses none of its scientific value. Much valuable work on this remarkable Order has been accomplished during recent years,—thanks to the labours of Sir William Turner, Sir W. H. Flower, and others,—and a general work on the group had become a recognised want. This desideratum is well supplied by Mr. Beddard's timely volume.

The general scope of the work is indicated by the headings of its various chapters, which are devoted to External Form, Internal Structure, Comparison with other Aquatic Mammals, Position in the System and Classification, Hunting Whales, Right Whales, Rorquals, Toothed Whales, Beaked Whales, Dolphins, Anomalous Dolphins, Zeuglodonts, and other Allies.

The book is well printed and illustrated, and is extremely reasonable in price.

THE MYCETOZOA. By the Right Hon. Sir Edward Fry, D.C.L., F.R.S., etc., and Agnes Fry. (London: "Knowledge" Office, 1899.)

The authors of this little book are enthusiasts in the best sense, writing with the desire to communicate to others some conception of the great interest and importance of the questions suggested by the study of the very curious beings that form the subjects of it. The story of the Mycetozoa is admirably told, without attempting to describe the species. Numerous questions of far-reaching importance are suggested by the peculiar structure and modes of reproduction and of response to stimuli exhibited by Mycetozoa. These questions are discussed in the manner that was to be looked for from Sir E. Fry, though here and there slips occur, as on p. 35, where it is stated that "all plants with a square stalk and lipped flowers will be found to have a four-lobed ovary and four nuts on the bottom of the calyx, and these belong to the family of the Labiatae," and on p. 63, where the multinucleate Algæ are said to "agree in possessing no cell walls." The book is well illustrated, and forms an excellent introduction to the study of a fascinating group on the borderland of plants and animals.

The Annals of Scottish Natural History

No. 36]

1900

[OCTOBER

THE GREYLAGS OF BLAIR DRUMMOND.

By Lieutenant-Colonel DUTHIE,
Member of the British Ornithologists' Union.

To dwellers in the lower parts of the Vale of Menteith, a not uncommon sight is presented, especially in the autumn after the crops are gathered, of a flock of geese flying overhead in their well-known V-shaped order, uttering their wild, gaggling notes as they proceed on their way.

“Wise persons who don’t know” prophesy a hard winter, for have not the wild geese already arrived from the north! But to those who live in the district these birds are easily recognised as the wild geese of Blair Drummond.

From information kindly supplied to me by Colonel Home-Drummond, from notes made by his keepers, and from observations of my own, I am able to give the following facts regarding these birds, which may be useful to compare with the observations of those who have the opportunity of studying the habits of other flocks of semi-domesticated water-fowl. The birds referred to are Greylag Geese (*Anser cinereus*). The original pair came from North Uist, having been given by the late Sir John Campbell-Orde to the late Mr. Charles Drummond-Moray of Abercairney a little over twelve years ago. Both birds were pinioned, and they were

handed over to the hen-wife, who fed them with the poultry, and they soon became very tame. After a short sojourn at Abercairney they were transferred to Blair Drummond and placed on a small loch near the house, where they nested on an island and produced a brood in the first spring after their change of quarters. They steadily increased, and at the end of six years they formed a flock of thirty birds. No particular record has been kept of their numbers, which varied according to circumstances. Some were doubtless shot in the neighbourhood ; some of the very young were taken by rooks and rats, etc. ; and many eggs were unfertile. After reaching a maximum of between forty-five and fifty birds, they have since decreased.

The Blair Drummond loch and its vicinity is still the headquarters of the flock. After breaking up into pairs in the spring they scatter and nest on the island, on the shore of the loch, in the shrubberies near the house, and on neighbouring mosses ; and when the young are strong on the wing the various broods congregate. By the beginning of July the numbers contained in the flock for the year may be estimated.

During incubation the gander is very fierce when guarding the nest, and shows fight when an intruder approaches too near. One of the keepers on one occasion received a severe blow on the leg from the bird's wing. When the young are hatched out, he still takes a prominent part till they are able to fly.

During the summer and early autumn the geese feed chiefly in the grass parks round their sanctuary, gradually extending their flights as the season advances. Being exceedingly fond of grain, they sometimes travel long distances to a good stubble-field.

Their time of feeding, as in their natural state, is in the daytime, but in the autumn it is regulated by harvesting operations, and as generally they cannot begin to feed till the evening is far advanced, they continue their repast late into the night.

They do not always fly together in one flock, but sometimes break up into smaller parties. They fly round and round very warily for some time before settling, and then

pitch right out in the middle of a field, and, with sentries posted, a near approach to them is impossible.

They are sometimes seen feeding in the same field with wild birds, with which, however, they do not associate, and although they answer the calls of the wild geese which pass over in great numbers between the estuary of the Forth and Cardross Moss in the winter time, they do not join them.

In severe frosts, when the ground is hard and their water frozen, they disappear, and remain away for a long time, probably frequenting tidal waters. In the exceptionally hard winter of 1894-95 they were absent from the middle of December till the middle of March. They went away in two flocks of sixteen and twelve birds respectively, and returned together on the same day without one of their number missing.

With regard to the Blair Drummond Greylags not joining the wild birds, Mr. Macdonald of Balranald, North Uist, with whom I have been in correspondence, has a different experience. He has had a flock of semi-domesticated geese for some years, which cross with his tame ones. He tells me that unless they are pinioned there is a great risk of losing them during the winter and spring, as such large flocks of wild geese frequent the loch near his house where the tame ones feed, and the former often draw away some of the latter which fly best—as a rule the older birds remain and hatch out on the moss away from the tame birds.

Mr. Macdonald once pointed out to me a pair of Swans which he has had for over thirty years. They have a brood every spring, and unless the cygnets are pinioned they join the wild swans, and only come back at certain times.

I was unable to obtain any information as to the successful hatching out of any eggs laid outside the Blair Drummond domains till this year, when news was received that a pair of *wild geese* had nested at Ardoch near Braco, and that a young bird had been secured and was in captivity. Having been asked to go there and investigate the affair, I was able to clear up what was a mystery to those who were unaware of the existence of the Blair Drummond birds. The distance between the two places is ten miles as the crow or goose

flies, and I may add that in selecting this new nesting-place the stray pair do not lose the title which I have given them, for Ardoch is the property of Colonel Home-Drummond.

I first saw the captive gosling, which was in the pheasantry, following the keeper about like a dog, and feeding out of his hand. We then visited the loch, which is an ideal place for water-fowl, except for the numbers of pike which infest it. I learnt that about five years ago Grey Geese were observed haunting this loch in the spring time, and that three years ago a pair nested there on an island, and five eggs were laid, all of which were unfertile; last year again there was a nest on the same spot, and six addled eggs was the result; this year was more propitious, for out of five eggs laid, two young birds were produced, one of which, above alluded to, was secured, and the other, which we saw on the loch, had hitherto escaped capture. I noticed that it was larger than the captured bird.

Since this visit in June, I again went to Ardoch in August, and found that the second gosling had been caught and pinioned, and I saw both the young birds swimming about on one of the ponds near the house. The difference in size is most marked, showing either that the superiority of natural over artificial food has told (for the poultry-fed bird is the smaller of the two), or, what is hoped, that the larger bird is a gander—his pugnacity towards other fowl rather points to this fact.

Sir James Bell, who is at present living at Ardoch, is much interested in these birds, and both the young and the old pair, if they return to the loch to nest, are sure to receive every care and protection in their new sanctuary.

It would be interesting to see the start of a new colony; but the conditions are different, and the chances are against it. The old stock appears to be exhausted for want of new blood. No young birds are known to have been reared at Blair Drummond this year. One nest only was found; it contained ten eggs, all of which were unfertile; and, as has been stated, out of sixteen eggs laid in three years at Ardoch only two young birds have been produced.

The only chance is new blood, which doubtless could be procured from the Hebrides without difficulty, if desired.

CONTRIBUTION TO THE ORNITHOLOGY OF KINCARDINESHIRE.

By A. NICOL SIMPSON, F.Z.S.

(*Continued from p. 153.*)

BARN OWL.—Mr. George Crabb, London, a keen ornithologist, informs me that he remembers in his youth of this bird breeding in Fordoun. He often saw the birds at the spinning mill at Auchinblae when he was a boy. Of recent years it is unknown, so far as my knowledge goes.

LONG-EARED OWL.—A resident, and breeding in the neighbourhood of Drumtochty Castle, and doubtless elsewhere in the county, but nevertheless it is not abundant.

SHORT-EARED OWL.—Far more common than the last named, and pretty widely distributed as a rule.

TAWNY OWL.—Fairly plentiful in the wooded districts.

HEN HARRIER.—I have seen a specimen said to have been got in the county.

COMMON BUZZARD.—An occasional visitor (*H.*).

ROUGH-LEGGED BUZZARD.—A specimen in Drumtochty collection is said to have been shot in the district in 1889.

GOLDEN EAGLE.—Almost annually one or two visit the hills in the autumn and do some damage amongst the game of the hills. In 1895 the gamekeeper of Glensaugh shot one in the act of devouring a lamb. This bird was accompanied by a mate, which escaped (*M.*). Since then one or two have been noticed in the same locality. In September of the year named another specimen was observed. The latest date for this bird is 8th December 1897, when one was seen in the vicinity of Drumtochty (*M.*).

SPARROW HAWK.—To be found in almost all the larger forests.

KITE.—Said to have been secured from time to time within the last thirty odd years. There is no authenticated instance, however, so far as I have learned.

HONEY BUZZARD.—Same as the last named.

PEREGRINE FALCON.—Breeds at the sea cliff, and reported also as breeding in various inland parts. This is more than likely, seeing the bird is resident both in the counties of Forfar and Aberdeen.

HOBBY.—One or two stuffed specimens exist, but no date or locality can be learned. The conjecture is that such specimens belong to the county, but at best it is only surmise.

MERLIN.—Not common. Observed one at St. Cyrus in summer of 1899. Occasionally to be met with about the quieter portions of the uplands.

KESTREL.—Of all the lesser birds of prey this is the one I see most frequently.

OSPREY.—On 15th May 1897 I watched one of these birds fishing in Glensaugh Loch. It was evidently a wanderer, and was closely watched by the Geese on the water, where their young were floating. When the Osprey dived to the water, the male Goose would rise from the loch, fly direct at the stranger, and drive it off for a time.

CORMORANT.—Resident (*H.*). No doubt the bird breeds about the rocky coast, but personally I have not a note on it.

SHAG.—*H.* says “probably occurs in Kincardineshire”; and, as I have seen it on other parts of the east coast, I do not question this.

GANNET.—A visitor only to the coast.

HERON.—Resident. There are three or four heronries within the county. Stray birds may be seen almost any day fishing in the burns. One day I noticed one catch a big gray rat, and make off to a neighbouring field with it.

PURPLE HERON.—One is said to be in Drumtochty Castle collection. This was shot in January 1895 (*M.*). Although I have seen this collection, my memory does not confirm the identification of this special bird.

BITTERN.—“Occurring at long intervals” (*H.*). I saw a stuffed specimen in a gamekeeper’s house, some years ago, near Marykirk. This may be the bird mentioned by *H.* as having been shot in 1867 at Bogmuir, near Laurencekirk.

GLOSSY IBIS.—*H.* marks this “abnormal or irregular visitant.” In his East of Scotland Report he also mentions one having been shot at Banchory in 1844.

PINK-FOOTED GOOSE.—Some confusion exists here. Many of the so-called “Bean” and other species observed seem to me to be neither more nor less than the pink-footed species as mentioned by *H.* in his report printed at Perth some years ago.

CANADIAN GOOSE.—These can only be inserted as birds introduced to the ornamental waters.

WHOOPEE.—Several said to have been shot in the county. One in the Drumtochty collection was secured in the neighbourhood, it is said.

COMMON SHELDRAKE.—Breeds where suitable places occur, but not a common species.

WILD DUCK.—Fairly abundant, and breeds on all the waters more or less. Found about ditch sides often far from their breeding haunts, both singly and in pairs. I often flush them during a walk, and a pond within a few hundred yards of my windows is a favourite resort in winter. At a farm near by, a duck has settled on the mill-pond, and become quite friendly with the ordinary Pekins and Aylesburys of the farm. It accompanies the other ducks indoors, and is quite tame. I myself have a drake which has kept the company of the barndoor fowls for years, and never attempted to escape, which it might quite readily do, as its wings are as nature framed them.

COMMON TEAL.—Widely distributed, and not rare.

PINTAIL.—Usually caught about the sea coast. One or two are spoken of in rural parts, but the last recorded instance I have is of a male shot at Johnshaven on 20th November 1897.

WIGEON.—Breeds in Fordoun (*M.*).

TUFTED DUCK.—Bred in Drumtochty Glen in 1899 (*M.*).

WOOD PIGEON.—The county being a barley-producing one, vast flocks can be seen in the fields. Of late an attempt has been made to thin their ranks.

ROCK PIGEON.—Colonies exist more or less all along the rocky sea coast. Stray examples of dovecot Pigeons may occasionally be seen flying out from the rocks, along with the true Blue Rock.

STOCK DOVE.—Mr. Milne has got the nest and eggs in Fordoun parish. Otherwise I have heard of no record.

PALLAS SAND GROUSE.—“Irregular visitant,” writes *H.*; but in his extended notes he indicates that the county had its full share of the extraordinary irruption during the year 1863. There is every reason also to believe the county was favoured by the arrival of this rare bird during the summer of 1888, when it was noted in the other eastern counties.

PHEASANT.—Abundant all over the county. Large numbers are annually hatched out under poultry. Kincardineshire is a sporting domain, and hence owns plenty of game birds.

PARTRIDGE.—Same as Pheasant, and many nests are also hatched out under barndoor fowls. The lower grounds of the Howe are famed for yielding heavy bags of Partridges annually.

QUAIL.—One was shot at Laurencekirk nearly twenty years ago. I saw the bird at the time. This is the only instance of its appearance I can submit.

PTARMIGAN.—Resident, but confined to the higher hills.

RED GROUSE.—Breeds throughout the county, frequenting the hills.

BLACK GROUSE.—Same as preceding. I notice it increases rapidly in numbers where young plantations are formed.

CAPERCAILLIE.—Breeds in most of the higher woods.

WATER RAIL.—Not often met with, but breeds in various localities. It is a very shy bird, which accounts in some measure for its being unobserved.

LAND RAIL.—Reaches the shire about the first or second week in May. The bird seems to call more during a shower: at least it seems to me to do so.

MOOR HEN.—Common on all the burn sides and about the water-ways. I have seen some quite tame, and at present know of several pairs that breed in gardens quite close to dwelling-houses. One severe winter lately a number fed daily with my poultry. This year I saw a nest fully eight feet from the ground.

COOT.—Not so common as the last named, but nests wherever suitable sites occur.

GOLDEN PLOVER.—On the moorland and higher ground this bird brings out its brood. During winter they are often seen in the fields, and numbers seek the seaside annually.

RINGED PLOVER.—Although I understand the bird breeds over a rather wide area, I have never seen it unless about the sea margin.

LAPWING.—Extremely common, when one considers the vast quantity of eggs collected by boys all over the shire. These eggs are bought by local shop-keepers and sent in to town merchants, who again dispatch them to London market.

TURNSTONE.—Sometimes observed inland, but more frequently about the sea-shore. Not very common even there.

OYSTER-CATCHER.—To be met occasionally amongst the rocks and shingle at Stonehaven and elsewhere. Breeds on many of the inland streams.

WOODCOCK.—I see numbers every fall, and learn of others being shot in various localities. It is a regular breeder in the shire.

COMMON SNIPE.—Very widely known, but still very sparingly distributed about the marshy banks and flats of the burns. It nests in most of the parishes.

JACK SNIPE.—*H.* writes it down as a winter visitor. *M.* secured a specimen last year at Auchinblae.

DUNLIN.—Often shot by amateur gunners near the coast towns and villages.

SANDERLING.—Found towards autumn on the coast.

COMMON SANDPIPER.—Various burns harbour a pair or two of this interesting bird.

SPOTTED SANDPIPER.—In the Statistical Account of Craigo Parish, mention is made of this bird. [A mistake, no doubt about it. —Eds.]

REDSHANK.—Breeds in the districts of Fettercairn, Garvock, etc., and is by no means a rarity.

GREENSHANK.—I question being able to claim it as a breeder within the county, but it is sometimes met towards the winter months.

CURLEW.—Breeds on the hill slopes, and is a very common bird about the coast in the fall and during winter.

ESQUIMAUX CURLEW.—Recorded 6th September 1866 (*H.*, Report to E. S. N. Society).

COMMON TERN.—A summer migrant, according to *H.*

LITTLE TERN.—*H.* speaks of this in the same terms as the common species.

BLACK TERN.—I picked up a dead bird on the coast at St. Cyrus in the spring of last year (1899).

BLACK-HEADED GULL.—On 27th March of this year I counted no fewer than seventeen birds in one field, and occasionally observe them singly during my walks.

COMMON GULL.—Termed resident and common by *H.*

HERRING GULL.—Fairly numerous at several places on the coast.

LESSER BLACK-BACKED GULL.—During autumn visits the coast, but not common.

GREAT BLACK-BACKED GULL.—Occasionally found about the tidal basins, especially in severe weather.

KITTIWAKE.—Breeds on the sea cliffs, and is sometimes seen inland.

MANX SHEARWATER.—Rare. One was shot at Johnshaven in the fall of 1899.

RAZORBILL.—Breeds on the coast. Have seen them lying dead about the salmon-nets on the sands repeatedly. Evidently these birds get caught in the net and are drowned.

COMMON GUILLEMOT. Breeds at the cliffs about Dunottar. There is a portion known as the "Fowlsheugh," where various species nest; and the "Marrot" of the fisherman nests about this

locality. At St. Cyrus I have counted no fewer than ten examples in a short walk on the sea border, all more or less in an advanced state of decomposition.

BLACK GUILLEMOT.—Found here and there on the rocky coast. Saw several in 1898 on the rocks at Muchalls, and I conjecture they breed at “Fowlsheugh.”

LITTLE AUK.—Year after year there are specimens driven on our coast in stormy weather. Some years ago one was got at Auchinblae, and is now in the school collection. This year (17th March) one was found dead near my garden. Many others are recorded.

PUFFIN.—Not very common, but I have seen solitary examples on the coast at times. In 1898 one passed me within twenty yards on the beach at Bervie.

GREAT NORTHERN DIVER.—Its name is given in some old works on county lore, and being at times identified on the Forfarshire coast, doubtless the bird may be claimed for this county.

LITTLE GREBE.—Frequently found about the less disturbed inland lochs, where it breeds.

THE FISHES OF THE FIRTH OF FORTH AND ITS TRIBUTARIES: No. II. FURTHER ADDITIONS AND OCCURRENCES OF RARE SPECIES SINCE DR. PARNELL'S “ESSAY” OF 1837.

By WILLIAM EAGLE CLARKE, F.L.S.

IN a previous communication (“Annals,” 1900, pp. 8-17), I enumerated the fishes which had been added to the fauna of the Forth waters since the publication of Dr. Parnell's “Essay,” and gave the essential particulars relating to the occurrence of each species.

In the present contribution I propose (1) to supplement my former paper by the addition of two species, and to give some further information concerning certain fishes treated of therein;¹ and (2) to give particulars of the occurrence of

¹ That this should be necessary is due to the fact that the first contribution had to be produced at a few hours' notice, to supply the place of another paper which failed us at the last moment.

a number of Dr. Parnell's rarer species recorded since the year 1837, and thus to bring that author's account of them down to date.

I have again to acknowledge my indebtedness to the Annual Reports of the Fishery Board for Scotland: especially have the systematic monthly trawling experiments made by the "Garland" during eleven years—1886-1897—added much valuable information relating to the fishes of the Firth and their distribution within the estuary at all seasons.

For the purposes of these investigations the Fishery Board established a number of stations in the Firth, and these were visited monthly, and complete records kept of the fishes captured, by means of the trawl, at each of them.

As frequent allusion will be made to these stations, it will be advantageous to particularise them here, giving their situation, depth, and the nature of the bottom of each. This will obviate much repetition under the various species.

Station.

1. East of Inchkeith: extending in a N.E. direction 4 miles. Depth: 10-18 fathoms. Bottom: chiefly mud.
2. North Bay, off West Wemyss. Length: 3.5 miles. Depth: 9-12 fathoms. Bottom: mud and stones; partly sand.
3. East of Inchkeith. Length: 7 miles. Depth: 8-10 fathoms. Bottom: mostly mud; also shells and stones.
4. South Bay, off Fisherrow and Aberlady. Length: 7.5 miles. Depth: 5-7 fathoms. Bottom: sand and shells.
5. West of Isle of May. Length: 5 miles. Depth: 20-30 fathoms. Bottom: mud.
6. Off St. Monance and Pittenweem ("Fluke Hole"). Length: 1.75 miles. Depth: 13-14 fathoms. Bottom: sand and gravel.
7. Between Bass Rock and Fidra. Length: 4.5 miles. Depth: 11-14 fathoms. Bottom: sand, mud, and stones.
8. South of Isle of May (east of Bass Rock in N.W. direction). Length: 5 miles. Depth: 20-30 fathoms. Bottom: sand and mud.
9. South-east of Isle of May. Length: 5.5 miles. Depth: 29-32 fathoms. Bottom: sand, mud, and stones.

The classification and nomenclature followed are those of Day's "British and Irish Fishes" (1880-1884). I am aware that these important features require modification and correction; but since this work remains our most recent

authority on the subject, considerations of convenience may be allowed to outweigh other exigencies. I have, however, indicated, in square brackets, a few necessary changes in nomenclature.

It is somewhat remarkable that we lack further information for quite a number of uncommon fishes which came under the notice of Dr. Parnell or his predecessors. Thus we appear to have no additional records for the past half-century, or more, regarding the occurrence of the following species in the Firth:—*Pagellus oweni* (*P. carne*, Parnell), *Maurolicus pennantii* (*Scopelus humboldtii*, Parnell), *Thynnus pelamys*, *Gobius niger*, *Mugil capito*, *Atherina presbyter*, *Cetenolabrus rupestris* (*Crenilabrus rupestris*, Parnell), *Brosmius brosme* (*B. vulgaris*, Parnell), *Clupea alosa* (*Alosa communis*, Parnell), *Nerophis ophidion* (*Syngnathus ophidion*, Parnell), *Selache maxima* (*Selachus maxima*, Parnell), *Rhina squatina* (*Squatina angelus*, Parnell), *Raia fullonica* (*R. chagrina*, Parnell), and *Raia maculata*.

I. ADDITIONAL SPECIES.

The following two additions bring the grand total of Forth fishes to 142 species.

CANTHARUS LINEATUS (*Montagu*) [CANTHARUS CANTHARUS (*Gm.*)].

GÜNTHER, "Catalogue of Fishes," vol. i. p. 414, 1859.

This species, known as the Black Sea-Bream and Old Wife, is an addition to Dr. Parnell's "Fishes of the Firth of Forth." It is an uncommon species in the North Sea, being an inhabitant of the Mediterranean, the North Atlantic to Madeira and the Canaries, but it reaches the south and west coasts of England.

Though not included in Dr. Parnell's "Essay," yet his collection, now in the British Museum (Natural History), contains an adult stuffed example from the "Firth of Forth" (Günther, *l.c.*).

There appears to be no further information regarding this fish as a Forth species.

RAIA CIRCULARIS, *Couch*.

"REP. FISH. BOARD SCOT.," 1893, part iii. p. 74 ;
1894, part iii. p. 45.

The Sandy Ray is also an addition to the fauna of the Firth of Forth, made since Dr. Parnell's researches. It appears to be very

scarce in the estuary, and the few examples which have been obtained were all immature fish.

One was captured in the trawl of the "Garland," within the Forth, in February 1893; and another, 8 inches long, was taken at Station 6 on the 28th of July in the same year.

On the 30th of November 1894, an example, 12 inches in length, was again captured by the "Garland" at Station 6.

I think it is probable that the Ray recorded by Mr. W. S. Young ("Proc. Roy. Phys. Soc. Edin.," vol. ii. pp. 417-419) as "*Raia M'Coyii*" (a name I cannot find in the synonymy of any of the *Raiidæ*) is referable to the Sandy Ray. M'Coy, in 1841, described ("Ann. Mag. Nat. Hist.," vol. vi. p. 405), without giving it a name, a Ray from the coast of Ireland, which afterwards proved to belong to this species; and it is possible that Mr. Young considered his Forth specimen was referable to this form, and adopted for it the specific name of *M'Coyii*. Mr. Young's example was 12 inches long and 6.25 broad, and was captured in the "Fluke Hole," off Pittenweem, in May 1860.

II. ADDITIONAL RECORDS OF RARE SPECIES.

The following records supplement the information given either in Dr. Parnell's "Essay" or in my own previous contribution, as the case may be.

PAGELLUS CENTRODONTUS, *Delaroche*.

PARNELL, pp. 206-209. "In the Firth of Forth very little is known regarding this fish, as its appearance there is of rare occurrence. Two specimens, however, have been noticed in the Firth" (p. 208).

We are not able to add much to the statements made by Dr. Parnell more than half a century ago. The common Sea-Bream must still be regarded as an infrequent visitor to, or rare in, the estuary, though, according to Professor M'Intosh ("Marine Fauna of St. Andrews," p. 172), it is "not uncommon" in St. Andrews Bay.

The following are the only additional occurrences known to me:—

Dr. John Alexander Smith records ("Ann. Nat. Hist.," 1852, vol. ix. p. 154) the capture of an example, 18.5 inches in length, in a trawl-net off the Isle of May, near the mouth of the Firth, on the 29th of November 1851. Dr. Smith remarks that it appears to be a very rare fish, or at least to be very rarely caught in our neighbouring seas, as far as he has been able to ascertain.

In the Report of the Committee on Marine Zoology, presented to the Royal Physical Society on the 7th of May 1862, it is stated that "in the month of February large numbers of the sea-bream were taken in the Firth" ("Proc. Roy. Phys. Soc. Edin.," vol. ii. p. 445).

During the eleven years (1886-1897) that the monthly trawling experiments were carried out in all parts of the Firth by the Scottish Fishery Board, and known as the "Garland" observations, only one example of this fish was obtained, namely, a mature specimen in September 1894.

PAGELLUS ERYTHRINUS (*Linnaeus*).

PARNELL, pp. 203-204. "In the Firth of Forth I have seen it once, where a fine specimen, 19 inches in length, was captured in a salmon-net near Musselburgh" (p. 204).¹

The only additional information regarding the occurrence of the Spanish Bream is afforded by the statement contained in Yarrell's "British Fishes" (2nd edition, vol. i. p. 121, 1841; 3rd edition, vol. ii. p. 145, 1859), that the author received two specimens from Dr. Parnell, namely, one from Devonshire and one captured near Musselburgh (as above stated), "*where a second specimen was also taken.*"

I think it is possible that Yarrell may have confounded Parnell's statements regarding the occurrences of *Pagellus acarne* (= *P. owenii*, Günth.) and *P. erythrinus* at Musselburgh. Parnell tells us that a second example of the *former* species was obtained at that place.

TRIGLA HIRUNDO, *Linnaeus*.

PARNELL, pp. 176-178. "In the Firth of Forth it is very rare, and the only instance I am aware of its capture in the estuary was during the month of August, near Queensferry, where it was found in a pool of water left by the receding tide; occasionally it is taken beyond the Isle of May" (pp. 177-178).

I am only able to add one other satisfactory occurrence of this rare wanderer to the waters of the Firth, namely, an example, 12 inches long, taken in the trawl of the "Garland" at Station 5 on the 19th of March 1891 ("Rep. Fish. Board Scot.," 1891, part iii. p. 53).

In the "Scotsman" for 25th June 1887, it is recorded that a "Flying-Fish," about 22 inches long, weighing 4 lbs., and with "wings" 8 inches long and as many broad, was captured in the salmon-nets at Belhaven, presumably on the previous day. I have

¹ This specimen is now in the British Museum collection (Günther, "Cat. Fishes," vol. i. p. 437).

little doubt that this supposed flying-fish was a specimen of the Sapphirine Gurnard—a species remarkable for the size of its pectoral fins.

TRACHINUS DRACO, *Linnæus*.

EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1900, p. 10.

Additional Records.—The following specimens of the Greater Weever were captured by the "Garland":—

♀, 10 inches, Station 1, 12th February 1888 ("Rep. Fish. Board Scot.," 1888, part iii. p. 212).

One, 12 inches, Station 6, 29th August 1895 (*op. cit.* 1895, part iii., p. 43).

Professor M'Intosh, in his "Resources of the Sea," Table XII., indicates that ten examples were taken by the "Garland," 1886-1895: three in February 1889; six in March 1889; one in August 1889.

TRACHINUS VIPERA, *Cuv. and Val.*

PARNELL, pp. 172-174. "Very seldom seen in the Firth of Forth."

Four occurrences are mentioned, three for Musselburgh and one for Queensferry (p. 173).

The Lesser Weever is not at the present time to be regarded as an uncommon species in the Firth. The fishermen at North Berwick inform me that they frequently capture it when netting for Sand-Launces in June.

The late Mr. Gray describes it as common in shallow water over the Tyne sands ("Zoologist," 1849, p. 2519); and other specimens have since, to my knowledge, been captured near Dunbar. The Marine Zoology Committee of the Royal Physical Society record its abundance in the season of 1860 in spots where much *ulvæ* and *enteromorpha* grew.

On 18th October 1890, a young specimen, 15 mm., was taken by the "Garland," at Station 1 ("Rep. Fish. Board Scot.," 1890, part iii. p. 337).

ORCYNUS THYNNUS (*Linnæus*).

EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1900, p. 10.

The following are additional records of the occurrence of the Tunny:—

One, 9 feet, captured near Queensferry in October 1868 (Walker, "Scot. Nat.," vol. ii. p. 195).

One, weighing 5 cwt., Firth of Forth, November 1868 (Day, "Brit. Fishes," vol. i. p. 97).

BRAMA RAI, *Block*.

PARNELL, pp. 209-210. "In the Firth of Forth it has occurred frequently" (p. 210).

In spite of Dr. Parnell's statement as to its frequency in the Firth, I can find very little subsequent information regarding the occurrence of Ray's Bream, and this refers to a single visitation only.

The winter of 1850 witnessed a marked immigration of this fish to the shores of the east coast of Britain, during which several were cast ashore in the Firth, from the end of November onwards (R. F. Logan, "Zoologist," 1851, p. 3058).

LAMPRIS LUNA (*Gmelin*).

PARNELL, p. 224, indicates that the Opah has occurred on seven occasions in the Firth.

During recent years, I have noted two occurrences, namely: a fine specimen captured at Aberdour on the 11th of October 1890; and one, 4 feet long and weighing 103 lbs., caught off North Queensferry on or about the 26th of July 1898.

XIPHIAS GLADIUS, *Linnaeus*.

PARNELL, pp. 215-217. "Specimens have occasionally been seen in the Firth of Forth at a considerable distance from the mouth of the estuary. In the year 1826, an individual that measured 7 feet in length was found stranded on the banks between Stirling and Alloa" (p. 216).

The only additional record that has come under my notice of the occurrence of the Swordfish in the Firth, is that of one taken in the salmon-nets at Bo'ness, on the 17th of July 1893. This specimen was 8 feet 2 inches in length, of which the "sword," measured from the tip to the front of the lower jaw, was 2 feet 5 inches. It is now in the Kelvingrove Museum, Glasgow (J. M'Naught Campbell, "Ann. Scot. Nat. Hist.," 1893, p. 247).

SCIÆNA AQUILA, *Lacépède*.

PARNELL, pp. 200-202. "A specimen about $3\frac{1}{2}$ feet in length was taken a short time since in the Firth of Forth" (p. 201).

The only additional record of the Maigre, of which I am aware, refers to one 3 feet 2 inches in length, captured in the Firth in July 1878, and exhibited at the meeting of the Royal Physical Society on the 15th of January 1879 ("Proc. Roy. Phys. Soc. Edin.," vol. v. p. 374).

LIPARIS MONTAGUI (*Donovan*).

EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1900, p. 11.

Montagu's Sucker was, I believe, first recorded for the Firth of Forth in the year 1890, when several immature and post-larval specimens were captured by the "Garland" (M'Intosh, "Rep. Fish. Board Scot.," 1889, part iii. pp. 288, 336, 337).

Since 1890, a number of specimens, chiefly of similar age, were taken by the "Garland," both at the surface and on the bottom, at the various stations in the Firth. Four miles east of the Isle of May, a specimen, 3 mm., was taken in the 10 fathom tow-net, and one 9 mm. in the bottom net, on 11th May 1891.

LABRUS MIXTUS, *Linnaeus*.

Labrus carneus, PARNELL, pp. 255-259. "Dr. Neill has recorded it in the 'Wernerian Transactions' [i. p. 538] as found in the Firth of Forth. In this locality it is undoubtedly a rare fish, as not a single specimen has occurred to me from that quarter" (p. 259).

To this I can only add a single record—one that I should like to see confirmed.

The late Mr. Robert Gray ("Zoologist," 1849, p. 2518) says "that the ballan wrasse (*Labrus maculatus*), and the red or trimaculated wrasse (*L. carneus*)" are "common in some localities near the shore" at Dunbar.

GADUS MINUTUS, *Linnaeus*.

EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1900, pp. 13-14.

Though not an abundant species in the Firth, yet the Power Cod cannot be considered a rarity. In his "Resources of the Sea," Professor M'Intosh indicates (Table XI.) that sixty-six mature examples were obtained by the "Garland," in the decade 1886-1895.

MERLUCCIUS VULGARIS (*Cuvier*) [MERLUCCIUS MERLUCCIUS (*L.*)].

PARNELL, pp. 350-352. "About two years ago, a single specimen was taken in a stake-net near Musselburgh, and sent to the Edinburgh market, where it appeared to be unknown" (p. 351).

The Hake is evidently an uncommon fish in the Firth. During the eleven years' trawling experiments conducted on board the "Garland," thirty-two examples only were captured, seven of which were immature. They were captured in all parts of the Firth below Inchkeith, and at all seasons of the year. The largest of these was 40 inches in length, and was taken at Station 5, on the 30th May 1893.

MOTELLA CIMBRIA (*Linnaeus*) [ENCHELYOPUS CIMBRIUS (*L.*)].

PARNELL, pp. 449-461. "I am not aware of the *Motella cimbria* (*Gadus cimbrius* of *Linnaeus*) having previously been noticed as a British fish. It was found in June last, a little to the east of Inchkeith" (p. 450).

A number of examples of this comparatively rare and local British fish—the Four-bearded Rockling—have been captured in the Firth since Dr. Parnell first discovered it in 1837. Indeed, it may be regarded as fairly common in deep water in the estuary and off the Isle of May.

I know of the following records:—

- Two, from the Firth were sent to Yarrell by Dr. Edward Clarke ("Brit. Fishes," 2nd ed. vol. ii. p. 275, 1841; 3rd ed. vol. i. p. 580).
- One, 7.5 inches, captured off the Firth, 8th February, 1886 (Brook, "Rep. Fish. Board Scot.," 1885, App., pp. 223-224).
- One, 9.5 inches, Station 9, 16th May 1889 (Fulton, *op. cit.* 1889, part iii. p. 357).
- Three, 6, 5, and 5.5 inches, near mouth of Firth, 22nd February 1890 (*id. l.c.*).
- One, 9.5 inches, Dunbar, 21st May 1890 (*op. cit.* 1890, part iii. p. 259).
- Two, 9 inches, Station 9, 14th April 1891 (*op. cit.* 1891, part iii. p. 60).
- One, 10.5 inches, Station 9, 12th December 1892 (*op. cit.* 1892, part iii. p. 99).
- One, 11.05 inches, east of Inchkeith, 26th December 1893, sent me by Mr. Thomas Scott, F.L.S.
- One, 9 inches, Station 8, 18th April 1894 ("Rep. Fish. Board Scot.," 1894, part iii. p. 47).
- One, 13.6 inches, cast up between Portobello and Leith, 25th October 1898 (Godfrey, "Ann. Scot. Nat. Hist.," 1899, p. 53).

MOTELLA TRICIRRATA (*Bloch*) [GAIDROPSAURUS TRICIRRATUS (*Bloch*)].

Motella vulgaris, PARNELL, pp. 354-355. "It is rare in the Firth of Forth, as well as along the whole of the eastern shores of Scotland" (p. 355).

Parnell gives no data regarding the occurrence of the Three-bearded Rockling in the Firth. The following records have come under my notice:—

- Male, 18.5 inches, 7th January 1886, between the Isle of May and the Bass Rock (Brook, "Rep. Fish. Board Scot.," 1885, App., p. 225).

- Two, 5.5 inches, Station 5, on the 10th May 1889. } (Fulton, "Rep. Fish.
Board Scot.," 1889,
part iii. p. 357.)
- One, 6 inches, Station 8, 9th May 1889. }
- One, 15.75 inches, Dunbar, 2nd June 1889. }
- One examined by me was captured five miles east of the Isle of May on the 9th of December 1892.
- One, 9 inches, Station 5, 24th February 1892 ("Rep. Fish. Board Scot.," part iii. p. 48).
- One, 9 inches, Station 9, 19th February 1892 (*t.c.* p. 50).
- One, 8 inches, Station 9, 6th May 1892 (*t.c.* p. 61).
- One, 7 inches, Station 9, 12th September 1892 (*t.c.* p. 84).
- One, 11 inches, Station 3, 26th December 1893 (*op. cit.* 1893, part iii. p. 95).
- One, 11 inches, Station 9, 12th September 1894 (*op. cit.* 1894, part iii. p. 49).
- One, 5 inches, Station 1, 17th April 1895 (*op. cit.* 1895, part iii. p. 35).
- One, full-grown, end of November 1897, caught near the Isle of May. It was considered by the fishermen to be very rare (W. Evans).
- Mr. Thomas Scott informs me that on the 4th of December 1897 he received a finely-coloured specimen which had been caught by a Granton trawler off the Carr Lightship on the previous day. It was $17\frac{3}{8}$ inches in length.

HIPPOGLOSSOIDES LIMANDOIDES (*Bloch*) [H. PLATESSOIDES
(*Fabricius*)].

Platessa limandoides, PARNELL, pp. 368-370. First recorded as British from Forth specimens ("Edin. New Phil. Jour.," 1835, p. 210) captured in the summer of 1834.

Parnell gives us no further particulars regarding the Long Rough Dab as a Forth fish. It is, however, an abundant species within and just outside the Firth. On the 6th of July 1895, when on a trawling expedition in the "Garland," we captured many specimens a little below Inchkeith.

During ten years' (1886-1895) experimental trawling by the "Garland" in various stations in the Firth, about 6570 mature and over 9000 immature specimens of this Pleuronectid were obtained.

ARNOGLOSSUS MEGASTOMA (*Donovan*).

EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1900, p. 14.

In addition to the previous information afforded, I find that, during the trawling experiments of the "Garland," seventeen examples of the Sail Fluke were obtained in the Firth between 1889 and 1896.

One of these was captured in Station 3; four in Station 5; seven in Station 8; four in Station 9; and one at the "mouth of the Firth."

Six of them were captured during the month of June, the others in February (2), March (1), May (1), July (1), August (1), September (2), October (1), and December (2).

The few Sail Flukes captured during the eleven years of systematic trawling, conducted for experimental purposes by the Fishery Board, conclusively proves that this fish is an uncommon species in the Firth.

SOLEA LUTEA (*Risso*).

EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1900, p. 14.

As additional information, it may be stated that single eggs of the Solenette have on three occasions been taken in the Firth.

One was obtained in Largo Bay by the "Garland" on the 16th of March 1894 ("Rep. Fish. Board Scot.," 1893, part iii. p. 298); one at the surface, at Station 6, on the 18th of April 1894 (*ibid.* p. 299); and one at the surface of the last-named station, on the 29th of August 1895 (*op. cit.* 1895, part iii. p. 226).

SCOMBRESOX SAURUS (*Walbaum*).

PARNELL, pp. 276-277. "According to Dr. Neill, it is not an uncommon fish in the Firth of Forth, . . . but of late years not a single specimen has been observed in the Firth" (p. 277).

This gregarious and migratory species appears, from the information available, to be an uncertain visitor to the Firth.

Since Parnell wrote there have been several remarkable influxes of the Saury Pike to the waters of the estuary.

Late in October and early in November 1855, vast numbers appeared in the Firth, ascending the river to Alloa, and it is said that millions of them were captured between that town and Kincardine. They were also obtained in great numbers by the fisher-folk at Musselburgh and Fisherrow, and on the 19th of November a considerable number were taken in the herring-nets off Queensferry ("Proc. Roy. Phys. Soc. Edin.," vol. i. pp. 49-51).

During the latter months of 1884 this fish was common in the Firth. During this immigration Mr. William Evans saw a number stranded at Kincardine on 23rd October, and received specimens from Aberlady.

CLUPEA PILCHARDUS, *Walbaum*.

PARNELL, pp. 320-322. "A few are taken occasionally in the summer months on the Berwick and Dunbar coasts, but since the year 1876, no appearance of a Pilchard has been observed in the Firth of Forth" (p. 321).

About the 10th of March 1861, considerable numbers of young Pilchards were brought to the Edinburgh market, along with herrings and sprats, which had been taken in the Firth. They were only caught in large quantities for a few days in March, but they had occurred sparingly with herring during the previous winter months. Mr. G. Logan, who recorded these facts ("Proc. Roy. Phys. Soc. Edin.," vol. ii. pp. 289-290), examined several dozens, the largest of which were fully 8 inches in length.

Professor M'Intosh ("Brit. Marine Food Fishes," p. 423) says that "it is many a year since pilchards were found in any abundance off the east coast of Scotland; in obedience to some natural laws, of which we know nothing, this fish has disappeared from our shores."

NEROPHIS ÆQUOREUS (*Linnæus*).

Syngnathus æquoreus, PARNELL, pp. 398-399. "This fish was first recorded as British by Sir Robert Sibbald, who obtained a specimen in the Firth of Forth prior to the year 1685. No other instance of its occurrence in that locality has since been noticed. It is one of the rarest of our British fishes" (p. 399).

The Snake Pipe-fish would still seem to be very rare in the Firth, though it is stated to be not uncommon along the east coast of Scotland. The following two records are all that have come under my notice:—

- One, 20 inches long, was captured among long weed on the coast of the Isle of May early in January 1860, and was exhibited at a meeting of the Royal Physical Society by Dr. John Alexander Smith ("Proc. Roy. Phys. Soc. Edin.," vol. ii. p. 139).
- One, 21 inches in length, was taken in a lobster-net off Inchkeith on the 17th of April 1861 (Young, *l.c.* pp. 290-291).

ORTHAGORISCUS MOLA (*Linnæus*) [*MOLA MOLA* (*L.*)].

PARNELL, pp. 401-403. "Seven or eight examples have occurred in the Firth of Forth" (p. 402).

Though a deep-sea form, the Short Sunfish is not very rare in the estuary, and is probably a much more frequent visitor than the data would lead us to suspect.

- One, 5 feet 2 inches, Firth of Forth, 1842 ("Proc. Roy. Phys. Soc. Edin.," vol. ii. p. 10).
- One, weighing about 500 lbs., mouth of Firth, 17th October 1855. Brought up by lead line of H.M. cutter "Woodlark" (*op. cit.* vol. i. p. 57).
- One, fully 4 feet and weighing between 300 and 400 lbs., off Pittenweem, November 1874 (Day, "Brit. and Irish Fishes," vol. ii. p. 275).

One, 4.5 feet, weighing over 4 cwt., Queensferry, 29th October 1887 ("Scotsman," 1st November 1887).

Three, 12 inches or less, on beach, North Berwick, 26th September 1890 (W. Evans).

One, 4 feet, Pettycur, 11th October 1890 (W. Evans).

I examined a specimen, weighing over 3 cwt., which had been stranded dead, but quite fresh, at Elie on the 5th October 1895.

LAMNA CORNUBICA (*Gmelin*).

PARNELL, pp. 413-414. "Several examples have been taken in the Firth of Forth, principally in herring-nets" (p. 414).

Although the Porbeagle occasionally visits the North Sea off the mouth of the Firth, it would appear that it only rarely enters the estuary.

A specimen, 7 feet long, was exhibited by Professor Jameson at the meeting of the Royal Physical Society on the 28th of April 1842, which had been captured in the Firth ("Proc. Roy. Phys. Soc. Edin.," vol. ii. p. 10).

One, 6 feet 11 inches long, was taken in a herring-net near Inchkeith on the 17th of November 1855 (J. A. Smith, *op. cit.* vol. i. p. 57).

Sir William Turner's paper, 'On the Presence of Spiracles in the Porbeagle Shark' ("Jour. Anat. Phys.," vol. ix. pp. 301-302, 1875) was based upon a young female, measuring 3 feet 5.5 inches, which had been captured off the mouth of the Firth.

One, 7 feet long, taken off the Forth on the 7th of October 1885, had been abstracting hooked fishes from the long lines (M'Intosh, "Rep. Fish. Board Scot.," 1885, App., p. 210).

LÆMARGUS MICROCEPHALUS (*Bloch*).

EAGLE CLARKE, "Ann. Scot. Nat. Hist.," 1900, p. 16.

Sir William Turner has kindly drawn my attention to the following additional occurrence of the Greenland Shark:—

A young male, 6 feet 1 inch, caught off the Isle of May at the mouth of the Firth, in May 1874 (Turner, "Jour. Anat. Phys.," vol. viii. p. 285).

RAIA MACRORHYNCHIUS, *Rafinesque*.

Raia intermedia, PARNELL, pp. 429-431. "This fish, which was obtained in the Firth of Forth in the month of May, seems to be a new species. . . . I have met with two examples of a variety of this fish, which were taken in the salmon-nets at Queensferry" (p. 430).

During the trawling experiments conducted on board the "Garland" for the years 1886 to 1895 inclusive, thirty-seven examples of the "Flapper Skate" are recorded as having been captured in 1886 and 1887, *and none afterwards*. Of these twenty-one were mature and the rest immature fish. It is very remarkable that the only specimens obtained should have been taken during the very earliest years of the "Garland's" important observations. Is it possible that a mistake was made in the identification of the species?

RAIA ALBA, *Lacépède*.

Raia oxyrhynchus, PARNELL, pp. 427-429. "Occasionally met with in the Firth of Forth" (*vide* Neill), "but no example has hitherto fallen under my own immediate notice. I cannot vouch for the accuracy of the statement."

Three White Skate were captured in the Firth on the 12th of June 1888: one, 24 inches, at Station 3; and two, 21 inches, at Station 4 ("Rep. Fish. Board. Scot.," 1888, part iii. p. 38).

TRYGON PASTINACA (*Linnæus*).

PARNELL, pp. 440-442. "The only example I have met with . . . was captured in the Firth of Forth in the salmon-nets above Queensferry in the month of August, and sent me as being the only fish of the sort the fishermen had ever seen" (p. 441).

The Sting Ray appears to be an extremely rare fish in the waters of the estuary and their immediate vicinity. I only know of a single instance of its occurrence since Dr. Parnell's record. In December 1897 I examined a specimen, 14.5 inches in extreme length and 6 inches broad, which had been captured off the Isle of May.

NOTES ON SCOTTISH CUMACEANS.

By THOMAS SCOTT, F.L.S.

THE new work on the Cumacea of Norway by Professor G. O. Sars, which is now in course of publication, will tend greatly to facilitate the study of this aberrant, but peculiarly interesting group of Crustaceans. This work, which forms volume iii. of Professor Sars' "Crustacea of Norway," will, like the two preceding volumes, be found indispensable to students of the British Crustacea, because the majority of the species hitherto observed in our seas are also represented

in the fauna of Norway, which in these volumes is being so fully described and figured.

With the assistance of the published parts of volume iii., I have been enabled to prepare the following notes on Scottish Cumacea, which may not be without interest to those who are devoting some attention to these curious animals. In these notes I have generally adopted the names and the arrangement of the species employed by Professor Sars, while among other books and papers which have been consulted are the following, viz.:—Middlehavet's "Invertebrate Fauna," part ii.; "Cumacea," by Professor G. O. Sars; 'Notice of Thirteen Cumacea from the Firth of Clyde,' by the late Dr. Robertson of Millport (published in part i. vol. iii. (N.S.) of the "Proceedings and Transactions of the Natural History Society of Glasgow," 1889); "A History of Crustacea," by the Rev. T. R. R. Stebbing, F.R.S.; 'On a Crangon, some Schizopoda and Cumacea new to or rare in the British Seas,' by the Rev. Canon A. M. Norman, M.A., etc. (published in the "Fourth Annual Report of the Fishery Board for Scotland," 1886); and various papers on Crustacea by the present writer, published in the Annual Reports of the Fishery Board for Scotland, in the "Annals of Scottish Natural History," and elsewhere.

In a paper on the fauna of Loch Fyne, by the late George Brook and myself, published in the "Fourth Annual Report of the Fishery Board for Scotland" (1886), *Hemilamprops uniplicata* is recorded, but somewhat doubtfully, amongst a few Cumaceans observed in East Loch Tarbert. The specimens supposed to belong to *Hemilamprops uniplicata* were immature, and as no adult specimens, which could satisfactorily be ascribed to this species, have yet been observed in the Clyde or anywhere else around the Scottish coasts, I have excluded it from the present list.

Professor Sars divides the Cumacea into nine families, eight of which are represented here, viz.—the CUMIDÆ, VAUNTHOMPSONIIDÆ, LAMPROPIDÆ, LEUCONIDÆ, DIASYLIDÆ, PSEUDOCUMIDÆ, NANNASTACIDÆ, and CAMPYLASPIDÆ. The PLATYASPIDÆ—the third family in Professor Sars' arrangement—is not represented in the Scottish cumacean fauna.

Fam. I. CUMIDÆ.

Gen. CUMA, *M. Edwards*, 1828.

(1) CUMA SCORPIOIDES (*Mont.*).—Firth of Forth (recorded by Goodsir under the name of *Bodotria arenosa*). Firth of Clyde—"taken in surface-net after sunset; depth 4-5 fathoms, Blackwater-foot, Arran" (Robertson). I have not myself observed this species in any gatherings of Scottish Crustacea. In it the inner ramus of the uropods is composed of a single piece. The form described and figured by Goodsir as *Bodotria arenosa* is evidently a male, as the abdominal segments are provided with what appear to be fully developed pleopods.

(2) CUMA EDWARDSII, *Goodsir*.—Firth of Forth (Goodsir; Leslie and Herdman). This species, which has the inner as well as the outer uropods two-jointed, appears to be generally distributed along the east coast of Scotland. I have records of its occurrence in the Firth of Forth, off Aberdeen, and in the Dornoch Firth. I have, however, no record from the west coast.

(3) CUMA PULCHELLA, *G. O. Sars*.—Appears to have a wide distribution, but being a small species, is easily overlooked. It was observed for the first time in Scotland in the Firth of Forth, where it was obtained in 1889-90. For several years this was the only Scottish locality in which it was known to occur; recently, however, I have been enabled to record its occurrence in the Clyde, having obtained one or two specimens in a gathering of Crustacea collected in the vicinity of the island of Sanda.¹

Gen. IPHINOË, *Spence Bate*, 1856.

(4) IPHINOË TRISPINOSA (*Goodsir*).—Firth of Forth (Goodsir). Firth of Clyde—taken plentifully in Kames Bay, Millport (a little beyond low water, and in the surface-net), and Loch Ranza (Robertson). I have taken it in the Firth of Forth, where at times it is moderately frequent, especially in bottom tow-net gatherings; and also occasionally in Loch Fyne, and in Kilbrennan Sound. *Iphinoë* (*Venilia*) *gracilis*, Spence Bate, is the male of this species.

(5) IPHINOË SERRATA, *Norman*.—I obtained this species in moderately deep water in Port Bannatyne Bay, Firth of Clyde, in March 1887. Also in a tow-net gathering, from 40 fathoms, collected in the Moray Firth in June 1898; and in a gathering made off Ballantrae, Firth of Clyde, in July 1899. I have not observed this *Iphinoë* in the Firth of Forth.

¹ "Seventeenth Annual Report of the Fishery Board for Scotland," part iii. p. 267 (1899).

(6) *IPHINOË TENELLA*, *G. O. Sars*.—Rev. T. R. R. Stebbing, F.R.S., in his useful work, entitled “A History of Crustacea” (published in 1893), states at page 303 that *Iphinoë tenella*, Sars, has recently been taken in the Clyde. This is a smaller species than either of the other two recorded here, being scarcely more than half the size of *I. trispinosa*. Like *Cuma pulchella*, it is a Mediterranean species, and I have not yet observed it; perhaps its distribution is more local than some of the others.

Gen. CUMOPSIS, *G. O. Sars*, 1879.

(7) CUMOPSIS EDWARDSII (*Spence Bate*).—This species has at various times been recorded under the name of *Cumopsis goodsiri*. It seems to prefer shallow bays where the bottom consists of fine sand, or of sand and mud; and in such situations it does not appear to be very rare. I have records of its occurrence in the Firth of Forth and in the Firth of Clyde. It was moderately frequent in shore gathering from a sandy bay, in front of Millport, Cumbrae, collected in May 1899; and in July of the same year it was observed in a gathering collected near Ballantrae. Dr. Dohrn collected this species at Millport in 1869, as well as the species to be next referred to.

(8) CUMOPSIS LONGIPES (*Dohrn*) (*Cumopsis laevis*, *G. O. Sars*).—This Cumacean was discovered by Dr. Dohrn mixed up with the more common form just referred to. In this species the cephalothoracic shield is devoid of the lateral folds or *pliae* which adorn the shield of the other. I have obtained specimens near Millport, Cumbrae; and the late Dr. Robertson also records it from the same place.

Fam. II. VAUNTHOMPSONIIDÆ.

Gen. VAUNTHOMPSONIA, *Spence Bate*, 1858.

(9) VAUNTHOMPSONIA CRISTATA, *Spence Bate*.—I obtained this species in East Loch Tarbert, Loch Fyne, in 1886; and I have also taken it in the vicinity of May Island, Firth of Forth. I have recently observed a single specimen—a male—in a gathering collected off Ballantrae, Firth of Clyde, on 19th July 1899, in 15-20 fathoms. *V. cristata* appears to be a somewhat rare species, but being small, it may easily be overlooked. It is apparently the only British representative of the family.

Fam. III. PLATYASPIDÆ.

[No Scottish representative of this family has yet been observed.]

Fam. IV. LAMPROPIDÆ.

Gen. LAMPROPS, *G. O. Sars*.

(10) LAMPROPS FASCIATA, *G. O. Sars*.—This appears to be a moderately common species on various parts of the Scottish coast, especially in shallow sandy bays. The following are a few of the places where it has been obtained—East Loch Tarbert, Loch Fyne; shore at Hunterston and at Inverkip, Firth of Clyde; near Invergordon, Cromarty Firth; and at Muckle Ferry, Dornoch Firth; at various parts of the Firth of Forth. In this species the telson is furnished with five terminal spines, two of which are shorter than the others. Adult specimens appear to vary in size.

Gen. HEMILAMPROPS, *G. O. Sars*, 1882.

(11) HEMILAMPROPS ROSEA (*Norman*).—I have seen this species on one or two occasions, and only in Clyde tow-net gatherings. It is readily distinguished from other Lampropidæ, recorded from our shores, by the greater number of terminal spines on the telson. A single specimen was taken in the bottom tow-net between Inverae and Furnace, Upper Loch Fyne. In this specimen, the telson was provided with eight terminal spines.¹ Last year the species was obtained in Kilbrennan Sound.²

(12) HEMILAMPROPS CRISTATA, *G. O. Sars*.—This species is stated to have been obtained in the Firth of Clyde in 1860, by the late Dr. Robertson,³ but does not appear to have been observed since. The telson is furnished with three terminal spines. It must be remembered, however, that the number of terminal spines in this and other species is not a safe guide if the specimens be immature.

Fam. V. LEUCONIDÆ.

Gen. LEUCON, *Krøyer*, 1846.

(13) LEUCON NASICUS, *Krøyer*.—I have found this moderately common in gatherings from the Firths of Forth and Clyde, as well as from other parts of the Scottish coasts. The gatherings in which specimens most frequently occurred were collected in comparatively deep water, *i.e.* from 20 to 40 fathoms and upwards. Those examined showed a tendency to vary in the size of the serratures of the lower margins of the dorsal shield; and the front margins of the rostral projection were also, in some examples, distinctly serrate,

¹ "Fifteenth Annual Report of the Fishery Board for Scotland," part iii. p. 134 (1897).

² "Seventeenth Annual Report," part iii. p. 267 (1899).

³ Norman, "Fourth Annual Report of the Fishery Board for Scotland," Appendix F, No. viii. p. 164 (1886).

being similar in this respect to *L. nasicoïdes*, Lillj., a species, however, which is not only considerably smaller than *L. nasicus*, but has the rostral projection almost truncate, instead of being decidedly oblique.

Gen. EUDORELLA, *Spence Bate*, 1867.

(14) EUDORELLA EMARGINATA (*Krøyer*).—This is the largest of the two species of *Eudorella* noticed here, adult female specimens measuring nearly half an inch in length. The late Dr. Robertson records it from Rothesay Bay, Bute, where it was dredged in 12 fathoms, and it has been obtained on several occasions in tow-net gatherings collected by the s.s. "Garland" in the deep water between Arran and the coast of Ayrshire, as well as in other parts of the Clyde district. This species has also been obtained in gatherings of Crustacea from the Firth of Forth.

(15) EUDORELLA TRUNCATULA, *Spence Bate*.—I have obtained this species in the Firth of Forth, in the Moray Firth, and in the estuary of the Clyde; but it appears to be less frequent than *Eudorella emarginata*. It is also scarcely half the size of that species.

Gen. EUDORELLOPSIS, *G. O. Sars*, 1882.

(16) EUDORELLOPSIS DEFORMIS (*Krøyer*).—This curious little Cumacean was first observed in the Firth of Forth, during 1889-90, and is recorded in the "Eighth Annual Report of the Fishery Board for Scotland," part iii. p. 329 (1890). Since that time the species has been obtained in gatherings collected off Aberdeen, in the Moray Firth, and in the Firth of Clyde. Though apparently extensively distributed, it seems to be a rare species, as seldom more than one or two specimens are obtained in any single gathering.

Fam. VI. DIASTYLIDÆ.

Gen. DIASTYLIS, *Say*, 1818.

(17) DIASTYLIS RATHKEI (*Krøyer*).—This appears to be the largest of the British species of *Diastylis*, some of the specimens in my collection measuring about 15 millimetres in length. It has been obtained in the Firth of Forth, in the Moray Firth, and at Tarbert, Loch Fyne.

(18) DIASTYLIS RUGOSA, *G. O. Sars*.—This seems to be more widely distributed than the last. I obtained it in East Loch Tarbert in 1886. The late Dr. Robertson records it from Loch Ranza and Blackwaterfoot, Arran, and it has been captured in Loch Etive, the Firth of Forth, and one or two other places, but nowhere very plentifully.

(19) *DIASTYLIS LUCIFERA* (*Krøyer*).—I have notes of this species from the Clyde district, and also from the Firth of Forth. It was recorded for the Moray Firth district by the late T. Edward of Banff; and quite recently it was captured, along with some other interesting organisms, by Mr. H. C. Williamson, while tow-netting in the Bay of Nigg, near Aberdeen.

(20) *DIASTYLIS ROSTRATA* (*Goodsir*).—According to Sars, the *Alauna rostrata* of Goodsir is identical with *Diastylis levis*, Norman, and, being the older name, is adopted by him. This Cumacean was recorded for the Firth of Forth by Henderson in December 1884.¹ It was dredged at Blackwaterfoot, Arran, in 20 fathoms, by the late Dr. Robertson; and it has been obtained in some gatherings collected by tow-net off Aberdeen by the Fishery steamer "Garland."

(21) *DIASTYLIS TUMIDA* (*Lilljeborg*).—This somewhat rare species was dredged at Blackwaterfoot, Arran, in 20 fathoms, by the late Dr. Robertson. A specimen from the Moray Firth, from 130 fathoms, measures fully 7 millimetres in length. This species has the basal portion of the telson cylindrical, and nearly as long as the tapering distal portion.

(22) *DIASTYLIS ECHINATA*, *Spence Bate*.—This species is recorded for the Moray Firth by the late T. Edward of Banff.²

(23) *DIASTYLIS SPINOSA*, *Norman*.—Taken at Blackwaterfoot, Arran, in 20 fathoms, and at low water on the west side of Helensburgh pier (Robertson). One or two specimens of a *Diastylis* which appear to belong to this species were dredged at the mouth of the Clyde, in 64 fathoms, between the Mull of Cantyre and Corsewall. I have *D. spinosa* also from the Firth of Forth, collected off North Berwick, 10-15 fathoms, in March 1891, but it has only recently been identified.

Gen. DIASTYLOIDES, *G. O. Sars*, 1900.

(24) *DIASTYLOIDES BIPPLICATA*, *G. O. Sars*.—This appears to be a moderately frequent as well as generally distributed species around the Scottish coasts. The late Dr. Robertson records it from Blackwaterfoot, Arran, where it was dredged in 20 fathoms. I have obtained a number of specimens in the deep water (40 fathoms) between Arran and the Ayrshire coast; in 64 fathoms at the mouth of the Clyde estuary; and it has also been dredged near the head of Loch Fyne. On the east coast I have obtained it in moderate abundance in a gathering from 50 fathoms, collected about 7 miles east by south of Girdleness; and in considerably over 100 fathoms in the Moray Firth, off Rosehearty. The *Diastylis lamellata*, Norman, is a synonym of this species.

¹ "Proc. Roy. Phys. Soc.," vol. viii, p. 311 (1883-1885).

² "Life of a Scotch Naturalist," by Samuel Smiles, p. 431 (1877).

Gen. LEPTOSTYLIS, *G. O. Sars*, 1869.

(25) LEPTOSTYLIS VILLOSA, *G. O. Sars*.—A number of specimens of this small Cumacean were obtained in a tow-net gathering collected in April 1896, in about 40 fathoms, between Arran and the coast of Ayrshire. There is no previous record of this species from the Firth of Clyde, and it is also an addition to the British fauna. The members of this genus have a much smaller telson than *Diastylis*, and the abdomen and uropods are proportionally more slender. In *Leptostylis villosa* the serration of the anterio-lateral margins of the carapace is peculiar; the "teeth" are not like those of a saw, but are rather hatchet-shaped; the margins here are perforated at slight intervals, and each perforation widens inwardly and ends in a rounded base, and thus each "tooth" is wider at the outside edge than it is inside. Sars describes these serrations as *lamellar*.

Fam. VII. PSEUDOCUMIDÆ.

Gen. PSEUDOCUMA, *G. O. Sars*, 1865.

(26) PSEUDOCUMA CERCARIA (*van Beneden*).—This is a generally distributed and moderately common species, and is generally more frequent in shallow sandy bays, but is also found in deep water. I have notes of its occurrence from almost every portion of the Scottish coast examined by me, *i.e.* the Firth of Forth, the Moray Firth, the Firth of Clyde, etc.

(27) PSEUDOCUMA SIMILIS, *G. O. Sars*.—I have obtained this species in a gathering of Crustacea from moderately deep water near the mouth of the Firth of Clyde, collected on 7th December 1899, but only recently examined, only a single specimen—a female—was observed. This species resembles *Pseudocuma cercaria* so closely, that it has only lately been recognised and described by Professor Sars. Now that its characters have been disclosed, its identification, when examined under the microscope with a $\frac{1}{2}$ or $\frac{1}{4}$ inch objective, is comparatively easy. It may be distinguished from *Pseudocuma cercaria* by the following characters: (1) the rostrum (*pseudorostral projection*) is less produced, and therefore its lateral margins are much less oblique, being nearly at right angles to the dorsal edge; (2) at the anterio-lateral corners of the *pseudorostral projection*, where the oblique lateral plicæ of the carapace terminate, there are three small but distinct teeth; (3) the basal stem of the uropods is proportionally longer, being at least equal in length, if not fully longer than the branches.

Gen. PETALOSARSIA, *Stebbing*, 1893.

(28) PETALOSARSIA DECLIVIS (*G. O. Sars*).—This small species was taken in the Firth of Forth (Largo Bay) in March 1891, in the

Moray Firth in 1893, and about 6 to 7 miles east by south of Girdleness, in 50 fathoms, in May 1898. In this last gathering *Petalosarsia* was moderately frequent, and both males and females were obtained. This Cumacean was described in the earlier Scottish records under the name of *Petalomera declivis*, but *Petalomera* was found to be preoccupied, and Rev. Mr. Stebbing proposed *Petalosarsia* as a substitute.

Fam. VIII. NANNASTACIDÆ.

Gen. NANNASTACUS, *Spence Bate*, 1865.

(29) NANNASTACUS UNGUICULATA, *Spence Bate*.—The only records of this species are for the Clyde; I have not yet observed it on the east coast of Scotland, nor do I know of any record of it from the east side. The late Dr. Robertson describes it as "moderately common" about Cumbrae, and the investigations carried on by the Fishery Board for Scotland have shown it to be present in Loch Fyne, in Kilbrennan Sound, and other parts of the Clyde estuary.

Gen. CUMELLA, *G. O. Sars*, 1865.

(30) CUMELLA PYGMÆA, *G. O. Sars*.—This diminutive species has apparently a wide distribution around our coasts. The late Dr. Robertson records having "taken it plentifully" at low water, Cumbrae. I have notes of its occurrence at Tarbert, Loch Fyne, in Kilbrennan Sound, and other places in the Firth of Clyde. It was obtained in the Moray Firth in November 1897; in the Firth of Forth in 1890, but only recently identified; and in a gathering of Crustacea, etc., collected by Mr. H. C. Williamson, in Aberdeen Bay, on the 9th of August last (1900).

Fam. IX. CAMPYLASPIDÆ.

Gen. CAMPYLASPIS, *G. O. Sars*, 1864.

(31) CAMPYLASPIS RUBICUNDA (*Lilljeborg*).—This species, which forms the type of an interesting group of Cumaceans, was first noticed in the Firth of Forth, in the vicinity of the Bass Rock, in 1889, and was recorded doubtfully as *Campylaspis affinis*, *G. O. Sars*.¹ Since that time this species has been observed in various other parts of Scotland. It was obtained in the Moray Firth in

¹ "Eighth Annual Report of the Fishery Board for Scotland," part iii. p. 330 (1890).

1893, along with several other interesting Crustaceans;¹ and afterwards in various parts of the Clyde area, as near Lowburn (Upper Loch Fyne²), at Tarbert Bank (Lower Loch Fyne) in moderately deep water (40 fathoms), between Arran and the Coast of Ayrshire,³ off Ballantrae in 15-20 fathoms, and near the mouth of the Clyde estuary in 64 fathoms. This and the next species have usually been captured on a muddy bottom in moderately deep water, and never in shallow sandy bays. In this species the cephalic shield is smooth, and the colour of the whole animal when alive is bright reddish or purplish, which to the unaided eye appears to be uniform, but under the microscope it breaks up into numerous minute points of colour on a lighter background.

(32) *CAMPYLASPIS COSTATA*, *G. O. Sars*.—This appears to be a rarer species than the last. It was first observed in some material dredged at the mouth of Port Bannatyne Bay, Bute, in November 1866, and, as far as I know, the only other places where it has been obtained are: (1) Tarbert Bank, Loch Fyne, in 17-20 fathoms, amongst some material dredged in December 1899 and March 1900, and kindly forwarded to me by Mr. F. G. Pearcey of the Fishery steamer "Garland"; and (2) in Loch Aber (north-east end of Loch Linnhe), in material dredged in 82 fathoms by the "Garland," and sent to me for examination. The specimens were of a reddish colour.

Thirty-two species of Cumacea are recorded in these notes, but this number would probably be considerably increased if a more thorough investigation were made of the Crustacea around our shores. Many of the Cumaceans are very small and easily overlooked; and the characters which distinguish the different species are correspondingly minute and not easily detected. A careful examination is therefore desirable, even of forms that have a close superficial resemblance to each other, in order to avoid mistaking the one species for the other.

¹ "Annals of Scottish Natural History," 1893, p. 250.

² "Fifteenth Annual Report of the Fishery Board for Scotland," part iii. p. 135 (1897).

³ "Seventeenth Annual Report of the Fishery Board for Scotland," part iii. p. 267 (1899).

NOTES ON THE FLORA OF PERTHSHIRE.

By G. CLARIDGE DRUCE, M.A., F.L.S.

(Continued from p. 168.)

- Rubus Selmeri*, *Lind.*—Near Lawers, Killin, and Blairgowrie. Probably the *R. villicaulis* of the "Flora of Perthshire."
- R. danicus*, *Focke.*—Near Blairgowrie, East Perth. New to the vice-county flora.
- R. Lindebergii*, *P. F. Muell.*—Killin.
- R. saxatilis*, *L.*—Ben Heasgarnich.
- Dryas octopetala*, *L.*—On Ben Heasgarnich, in fine flower.
- Geum rivale*, *L.*—Ascends to 3100 feet in Isla.
- Potentilla Sibbaldi*, *Hall.*, f. — Ascends to 3000 feet on Glas Thulachan.
- Alchemilla vulgaris*, *L.*, var. *alpestris* (Schmidt).—At 3000 feet on Glas Thulachan. It also occurs on Ben Heasgarnich, Lawers, where it descends to 400 feet on Loch Tay, Ben Laoigh, etc.
var. *filicaulis* (*Buser*).—On shingle by Loch Tay, near Tyndrum, etc.; Blairgowrie, etc.
- A. alpina*, *L.*, is mentioned as growing on Creag-na-Chaillach in Sibthorp MSS. of 1783.
- Rosa involuta*, *Sm.*, is recorded for Perth in the "Trans. Linn. Soc." (1816), p. 184. This appears to be *R. spinosissima* × *tomentosa* (*mollissima*, Willd.). No notice is taken in the "Flora of Perthshire" of the numerous references to Perthshire Roses made by Mr. Woods in the "Trans. Linn. Soc.," vol. xii., already referred to. Among these are *R. heterophylla*, Woods, there described from Finlarig; *R. scabriuscula*, *Sm.*, from the sides of Loch Tay, where I have seen it near Lawers—it is now put as a variety of *R. mollissima*, Willd., which is synonymous with *R. tomentosa*, Smith.
- R. mollissima*, *Willd.*, var. *resinoides* (Crépin as a var. of *R. tomentosa*), I gathered near Lawers some years ago; and it was named by M. Crépin. Mr. J. Cosmo Melvill's *Rosa Borreri* from Glen Artney is also referred by M. Crépin to this species.
- R. Eglanteria*, *Linn.*, "Sp. Pl.," ed. i., 1753 (a name which supersedes *R. rubiginosa* of the "Mantissa" of 1771), appears to be scarcely native in Strath Tay, but I am inclined to think it native in East Perth.

R. cæsia, *Sm.*, was first found by Mr. Borrer in Perthshire. This name antedates *R. coriifolia*, Fries, with which it appears to be synonymous. To this must be referred my own record of *R. canina*, *L.*, var. *pruinosa* (Baker); and so too must the Rev. E. F. Linton's record, *teste* M. Crépin. *R. cæsia* is a frequent plant of Strath Tay.

Cratægus Oxyacantha, *L.*—I have come to the conclusion that it will be advantageous to make two species of our Hawthorns, as is done in many European floras. As I have already pointed out in the "Annals," the characters derived from the leaf venation appear to be the most dependable. The commoner British plant is the one with leaves having the lower lobes with veins curving outwards. It usually has one style only, rarely two; the peduncles usually downy, rarely glabrous (var. *leiocalyx*), and the leaves usually much more divided. This, the common plant, is indeed the prevailing species in Scotland, so far as my observations and the study of the public herbaria go. Moreover, it is the *C. Oxyacantha* of the Linnean Herbarium, as we might have expected from its being the commoner form in northern latitudes. Therefore I propose to replace the name *C. monogyna* of Jacquin by that of *C. Oxyacantha*, *L.* The second species (which is not rare in the Midland counties, and I have seen specimens from as far north as Durham), is *C. oxyacanthoides*, Thuillier. The Rev. E. S. Marshall records this from East Ross; but, according to my definition, his plant is rather *C. Oxyacantha*, var. *leiocalyx*, as it is, I believe, only one-styled, and the leaf characters agree with this species.

Saxifraga quinquefida, *Haworth*, appears under three headings in the "Flora of Perthshire." It ascends to 2800 feet in Glas Thulachan, and to 3200 feet on Ben Lawers. I have again gathered a Saxifrage which Herr Freyn refers to *S. cæspitosa* on Ben Lawers; it is very near to the plant which Professor Engler called *S. decipiens*, Ehrh., var. *grænländica* (*L.*).

Callitriche pedunculata, *DC.*—Loch-na-Chait.

Epilobium alsinifolium, *Vill.*—Ben Heasgarnich, with a hybrid of which *E. alpinum* was the other parent. This hybrid has also been recorded by Rev. E. S. Marshall from Glen Shee ("Journ. Bot.," 1893, p. 231). I have recently had an opportunity of seeing the "Prospectus de l'Histoire des plantes de Dauphiné," and find that the spelling of the name is as given above, and not *alsinifolium*, as, quoting alas at second hand, I once suggested in these pages.

E. alpinum, *L.*, ascends to 3200 feet in H. Isla.

E. palustre, *L.*, var. *lavandulæfolium*, *Lec.* and *Lam.*—Glen Shee (see "Journ. Bot.," 1893, p. 231).

Cornus suecica, *L.*—Abundant on the ascent of Glas Thulachan, in fruit. It descends in Isla to 1600 feet.

Galium hercynicum, *Weig.* (*G. saxatile*, *L.*), ascends to 3000 feet on Glas Thulachan.

G. sylvestre, *Poll.*—Ben Laoigh, as the var. *glabrum*, *Koch* ("Syn.," p. 287). This forms a passage to the very compact *G. anisophyllum*, *Vill.* A form occurred on Meall Garbh at about 2500 feet.

G. palustre, *L.*, ascends to 1600 feet on the ascent to Glas Thulachan.

Scabiosa Succisa, *L.*, ascends to 2500 feet on Glas Thulachan.

Gnaphalium sylvaticum, *L.*, occurs at 2000 feet in Glen Shee. A form with very dark inflorescences and broader leaves has been noticed on rocks in Glen Shee. Similar ones to these were sent to the Record Club in 1882 as var. *alpestre* (see p. 43), and Mr. F. A. Lees reported it as being intermediate between *sylvaticum* and *norvegicum*. Another intermediate form from Glen Callater was referred by Professor Babington to *norvegicum*; but I now should refer it to *G. sylvaticum*, of which it is an alpine form or variety. Another plant in a luxuriant condition, with long bracts, which occurs at the base of the rocks on Creag-na-Caillich, rather closely approaches to *G. norvegicum*.

G. supinum, *L.*, with luxuriant specimens of the var. *fuscum*, *Scop.*, ascends to 3100 feet on Glas Thulachan.

Antennaria dioica, *Gaertn.*, ascends to 2500 feet on Glas Thulachan.

Achillea Ptarmica, *L.*, ascends to 1600 feet in Glen Shee.

Senecio Jacobæa, *L.*, ascends to 1600 feet in Isla.

S. viscosus, *L.*—On railway near Crianlarich.

Saussurea alpina, *DC.*, ascends to 3000 feet on Glas Thulachan, where it was rather frequent, as also on Ben Heasgarnich.

Aster longifolius, *Lam.*—Abundant by the Tay at Perth (see "Journ. Bot.," 1870, p. 261), "with *A. puniceus*, *L.*, *A. prenanthoides*, *Muhl.*, and *A. brumalis*, *Willd.*," Boswell Syme.

T. palustre, *DC.*—Ben Heasgarnich, Glas Thulachan, Ben Laoigh, etc.

Hieracium Pilosella, *L.*, for which two localities are given in the "Flora of Perthshire," ascends in H. Isla to 1600 feet.

- **H. graniticolum*, *Linton*.—On Ben Lawers in 1897, "apparently this species," *teste* Hanbury. New to Perthshire.
- H. eximium*, *Backh.*—Glas Thulachan, 2800 feet.
var. *tenellum*, *Backh.*—Between Ben Lawers and Glen Lyon.
- H. sinuans*, *F. J. Hanb.*—Ben Lawers. Very fine specimens in 1898.
- H. callistophyllum*, *F. J. Hanb.*, var. *glandulosum*, *F. J. Hanb.*—Ben Lawers.
- H. pictorum*, *Linton*, var. *dasythrix*, *Linton*.—Ben Laoigh and Creag-an-Lochain.
- H. rivale*, *F. J. Hanb.*—Ben Lawers.
- H. atratum*, *Fr. f.*—Glen Falloch, 2800 feet, *E. S. Marshall*; Stulich-an-Lochain (Groves).
- H. insulare*, *F. J. Hanb.*, var. *petrocharis*, *Linton*.—Ben Heasgarnich, Creag-an-Lochain.
- H. murorum*, *L.*, var. *rotundatum*, *Kit.*—Cairnwell ("Journ. Bot.," 1893, p. 232).
- H. sparsifolium*, *Lindeb.*—Tyndrum.
- H. corymbosum*, *Fries.*—Killin.
- H. duriceps*, *F. J. Hanb.*—Stob Garbh, West Perth ("Journ. Bot.," 1892, p. 260).
- Leontodon autumnalis*, *L.*, var. *Taraxaci* (*Hornem.*) (*pratensis*, *auct.*), ascends to 3000 feet on Glas Thulachan.
- Campanula rotundifolia*, *L.*, ascends to 3000 feet on Glas Thulachan and on Ben Lawers. Some of the alpine specimens have very large corollas, equalling in size specimens sent to the Exchange Club from North Uist in 1899 as var. *speciosa*, *More*.
- Vaccinium uliginosum*, *L.*, ascends to 2700 feet in *H. Isla*.
- Loiseleuria procumbens*, *Desv.*, ascends to 3200 feet on Glas Thulachan and descends to 2100 feet.
- Pyrola rotundifolia*, *L.*—A flowerless *Pyrola* on Ben Heasgarnich at about 2400 feet I think belongs to this species, but I took no specimens. I got it on the Argyll Cliffs of Ben Laoigh.
- Gentiana campestris*, *L.*, ascends to 2300 feet in *H. Isla*; the white-flowered form is not rare by Loch Tay.
- Mimulus Langsdorfii*, *Donn* (*M. guttatus*, *DC.*), in Glen Isla above Lunans. All the Scottish specimens which I have seen belong here.
- Digitalis purpurea*, *L.*, ascends to 1800 feet in *H. Isla*.

Veronica alpina, *L.*—Rather frequent on the cliffs at Glas Thulachan, ascending to 3100 feet. I have been unable to re-find it on Ben Lawers.

V. officinalis, *L.*, ascends to 2500 feet in H. Isla. A nearly glabrous form occurred on Glas Thulachan.

Euphrasia gracilis, *Fr.*—Ben Lawers, etc.

E. Rostkoviana, *Hayne.*—Ben Laoigh and Lawers.

E. brevipila, *Burnat* and *Gremli.*—Lawers.

Rhinanthus Crista-galli, *L.*, ascends to 2700 feet in Glas Thulachan. var. *Drummond-Hayi*, *B.* White, occurs there; but a form which I could separate from it only by the hairs being confined to the nerves of the calyx also occurs. Typical var. *Drummond-Hayi*, also occurs on Ben Laoigh and Ben Heasgarnich, and I have seen it on Creag-na-dala-Bige and in Glen Callater, South Aberdeen.

Pedicularis palustris, *L.*, ascends to 1500 feet in H. Isla.

†*Mentha alopecuroides*, *Hull.*—In several places by Loch Tay, near Lawers; but is always a relic of cultivation.

M. rubra, *Sm.*—Between Tyndrum and Crianlarich, an escape, E. S. Marshall in "Journ. Bot.," 1897, p. 69.

**Thymus Chamædrys*, *Fries.*—Herr Freyn refers some specimens I gathered on Ben Lawers to this species.

Pinguicula vulgaris, *L.*, ascends to 2600 feet in H. Isla.

Statice Armeria, *L.* (*Armeria maritima*, Willd.).—Rather frequent on Glas Thulachan; ascending to 3000 feet also on Ben Heasgarnich as the var. *planifolia* (Syme), but the three nerves are often seen at the base of the leaves only.

Littorella juncea, *Berg.*, ascends to 2000 feet in Breadalbane.

Polygonum viviparum, *L.*, ascends to 3200 feet in H. Isla.

P. aviculare, *L.*, ascends to 1300 feet in Glen Shee.

Rumex acutus, *L.*—Glen Shee, E. S. Marshall in "Journ. Bot." 1893, p. 233.

†*R. alpinus*, *L.*—Glen Isla, and near the pier at Lawers.

R. domesticus, *Hartm.*, ascends to 1250 feet in Glen Shee.

Oxyria digyna, *Hill*, ascends to 3200 feet in H. Isla.

†*Daphne Mezereum*, *L.*—"In woods near Taymouth," Sibthorp MSS., 1783.

Betula nana, *L.*—In the peaty portion of the corrie of Glas Thulachan, at an elevation of 2300 feet.

- Salix aurita* × *Lapponum*.—Corrie Ardran, E. F. Linton, "Journ. Bot.," 1892, p. 147; Lochsie, E. S. Marshall, "Journ. Bot.," 1894, p. 188.
- S. aurita* × *nigricans*.—Glen Lyon, E. F. Linton, "Journ. Bot.," 1892, p. 147.
- S. aurita* × *phylicifolia*.—Glen Lochay, Glen Lyon, E. F. Linton, "Journ. Bot.," 1892, p. 148.
- S. aurita* × *herbacea*.—Lochsie, E. S. Marshall, "Journ. Bot.," 1894, p. 185.
- S. caprea* × *Lapponum*.—Lochsie, E. S. Marshall, "Journ. Bot.," 1894, p. 185.
- S. phylicifolia*, *L.*—At Finlarig, Breadalbane, Rev. Mr. Stuart Smith, in "Trans. Linn. Soc.," vi., 1802, p. 123.
- S. phylicifolia* × *repens*.—Lochsie, E. S. Marshall, "Journ. Bot.," 1894, p. 185.
- S. strepida*, *Schleicher*.—Glen Lyon, Glen Lochay, E. F. Linton, "Journ. Bot.," 1892, p. 359 = *S. cinerea* × *nigricans*.
- S. Arbuscula* × *nigricans* (*S. Kraetliana*, Brügg).—Ben Lawers, E. F. Linton, "Journ. Bot.," 1892, p. 148.
- S. Smithiana*, *Willd.*—Between Spital of Glen Shee and Persie Inn.
- S. stipularis*, *Sm.*—Near Killin, Glen Lochay, E. F. Linton.
- S. Myrsinites* × *aurita* × *nigricans*.—Glen Lyon, near Fortingal, low in the valley, E. F. and W. R. Linton, "Journ. Bot.," 1892, p. 361.
- S. Myrsinites* × *phylicifolia* (*S. Normanni*, Anders.).—Ben Laoigh, E. S. Marshall, "Journ. Bot.," 1894, p. 167; and Meall Ghaordie, E. F. Linton, *l.c.*, 1892, p. 148.
- S. herbacea* × *nigricans*.—Meall-na-Saone, E. F. Linton, *l.c.*
- S. herbacea* × *reticulata* (*S. onychiophylla*, Anders.).—Meall-na-Saone, E. F. Linton, *l.c.*, 1892, pp. 149, 365.
- S. herbacea* × *Lapponum* (*S. sobrina*, B. White).—Watershed north of Ben Lawers, E. F. Linton and W. R. Linton, *l.c.*, p. 149.
- S. cinerea* × *aurita* (*S. lutescens*, A. Kern.).—Side of Loch Tay.
- S. Lapponum*, *L.*, ascends to 3000 feet on the rocks of Glas Thulachan.
- **S. Myrsinites*, *L.*—Ben Heagsarnich, Mid Perth, on the rocks of Glas Thulachan; new to H. Isla (and E. Perth). The plant I found may have traces of *S. herbacea* in it.
- Habenaria viridis*, *Br.*, var. *bracteata*, A. Gray (*Peristylis bracteata*, Lindl.).—Ben Lawers, Ben Laoigh, Ben Heagsarnich, Meall Garbh, Creag-an-Lochain, Glas Thulachan, etc. Herr Freyn agrees to my determination; and I am unable to separate them from American specimens.

- Allium carinatum*, *Fries*, was recorded as a Perthshire plant by J. Sim in "Rep. of Ex. Club for 1869," p. 14.
- Tofieldia palustris*, *Huds.*, ascends to 3000 feet on Glas Thulachan, and descends to 1400 feet.
- Juncus bulbosus*, *L.* (*J. supinus*, *Möench*) ascends to 3000 feet on Glas Thulachan. For a note on this plant see "Trans. Linn. Soc.," xii., 1816, p. 318.
- **J. castaneus*, *Sm.*—At 2900 feet on Glas Thulachan, first noticed by my friend the Rev. H. J. Riddelsdell, afterwards seen there in several places (new to Isla); also on Ben Heasgarnich.
- J. biglumis*, *L.*—Ben Heasgarnich, with *J. triglumis*, *L.*, var. *biglumoides*, *Roy*, MS.
- J. trifidus*, *L.*—At 3100 feet on Glas Thulachan; I think I have seen it higher on Ben Lawers.
- Juncoides spicatum* (*Luzula spicata*) was recorded from the very summit of Ben Lomond in Withering's "Bot. Arr.," 2nd ed., Stokes, p. 365, 1787. It ascends to 3000 feet on Glas Thulachan.
- Scirpus setaceus*, *L.*—Not unfrequent in mountain paths on Ben Lawers.
- Eriophorum vaginatum*, *L.*, ascends to 2800 feet in H. Isla.
- E. angustifolium*, *Roth.*—A very small form (var. *minus*) occurred on Ben Heasgarnich.
- Carex leporina*, *L.*—At 1600 feet in H. Isla. The name *C. ovalis*, *Good.*, is by some botanists chosen for this plant, because it is said that Linnæus confused *C. approximata* (*C. lagopina*) with it; but the synonyms and the habitat, "pratis udis," given in the "Species Plantarum," and the description, "Paleis . . . griseis, seminibus . . . longioribus," as Gaudin (in the "Agrostologia Helvetica," ii. p. 107) says, show that by *C. leporina*, Linnæus meant the plant which Goodenough subsequently named *C. ovalis*.
- C. canescens*, *L.*, var. *robustior*, *Blytt*, ascends to 3400 feet in Breadalbane. It occurs on Ben Lawers and Ben Heasgarnich.
- C. canescens*, *L.*, var. *dubia*, *Bailey*.—On Ben Lawers and on Ben Heasgarnich, Mid Perth, and very abundantly on the tableland above Glen Callater in South Aberdeen, and Forfar. On the Clova specimens Pfarrer Kükenthal remarks, "Strongly recalling *C. helvola*, with smaller dark-coloured spikelets and stiff stalk"; and he inquires if *C. lagopina* (*C. approximata*) occurs on this spot; but the Lochnagar locality is some eight or ten miles to the north-east, and, as on Ben Heasgarnich,

this variety grows at upwards of 3000 feet, and far away from the influence of *C. approximata*. We must seek for some other explanation as to the cause of the variation than hybridity, at any rate so far as *C. approximata* is concerned. On Ben Lawers I gathered it away from *C. helvola*, in micaceous bogs, with *C. echinata*.

- C. *canescens*, L., var. *robustior* (Blytt).—At about 2300 feet on Lochnagar and on the tableland above Glen Callater, South Aberdeen; and on Ben Lawers at 300 feet, and at lower elevations.

- C. *helvola*, Blytt.—Ben Lawers 1898, *teste* Pfarrer Kükenthal. On some specimens of this year's gathering he remarks: "Probably *C. canescens* × *echinata*, but much nearer *C. canescens* than the specimens sent last year. The spikelets are almost quite sterile. The sacs are more elliptic than oval, and somewhat longer beaked than in *C. canescens*, otherwise the difference from *C. canescens*, var. *dubia*, is very slight." The synonyms of *C. echinata* and *C. canescens* are *C. tetrastachya*, Traunst., *C. Caflischii*, Brügg., in "Jahrb. d. Nat. Ges. Graub.," p. 119, 1880, and *C. biharica*, Simk., "Enum.," p. 546, 1886. I may add that both the Rev. E. F. Linton and E. S. Marshall believe the Lawers plant to have the suggested combination. It is considered by many botanists, e.g., Christ and the younger Blytt, that *C. helvola* is a more or less stable hybrid of *C. canescens* with *C. approximata* (*lagopina*)—see my paper in "Journ. Linn. Soc.," xxxiii. (1898), pp. 458-464, where these botanists agreed in identifying the Lawers plant with *C. helvola*. I pointed out that *C. approximata* in its nearest locality is some sixty or seventy miles away from Ben Lawers, unless indeed it has escaped observation, or has died out, neither suggestion being very probable; whereas *C. echinata* is constantly associated with *canescens* in these mountain bogs. I still am unable to see conclusive proof of the presence of *echinata* in the Lawers *helvola*, although Kükenthal tells me he considers the longer beak of the perigynium affords that evidence. I made a careful examination of the forms of *C. canescens* and *C. echinata* as they grew together; but there was no difficulty in referring to one species or the other the various forms; and the foliage appeared to afford a good character for this separation. In the young stage the spikes of many sedges are very perplexing. All the plants of *helvola* had the foliage of mountain *canescens*, while the darker and more rigid foliage of *echinata*-forms appeared to be very constant. As Kükenthal says, the differences between *C. canescens*, var. *dubia*, and *C. helvola* are very slight, and I see greater difference between *C. Zahnii* (an acknowledged hybrid of *C. canescens*, in a mountain form, and *C. approximata*)

and *C. helvola*. It is somewhat remarkable that in our low-land bogs, as at Virginia Water, Berkshire, where *canescens* and *echinata* grow together, no intermediate has been found.

- C. echinata*, *Murray*, var. *grypos* (Schkuhr).—Ben Lawers, growing with *C. helvola*. On this Kükenthal remarks: "The alpine form, with very dark spikelets and strong curved stalk." In the very young state there is considerable resemblance to *helvola*, even closer than I had before realised; but as soon as seed had set or flowering was over the strong differentiation between the two species takes place. I collected some sterile or partly sterile forms; but if a fruit or two appeared they had the characteristic shape and nervation of *echinata*, and the foliage showed no approach to *C. canescens*. Moreover, I collected the same sterile forms on parts of the Lawers range well out of the influence of *C. canescens*. The result of my observations leaves me still uncertain as to the presence of *echinata* in the Lawers *C. helvola*.
- C. Goodenovii*, *Gay*, ascends to 2600 feet in H. Isla. Near Lochan-na-Lairige occurs the var. *juncella*, *Fries*.
- C. rigida*, *Good.*—"On top of Ben Lomond," J. E. Smith in "E. B.," t. 1809 (1782).
- Carex atrata*, *L.*—Ben Heasgarnich.
- C. atrofusca*, *Schkuhr* (*C. ustulata*, *Wahl.*).—I saw over a hundred specimens on Ben Heasgarnich.
- C. vaginata*, *Tausch.*—On Glas Thulachan, rare; new to H. Isla. On Ben Heasgarnich rather common.
- C. panicea*, *L.*—At 3000 feet on Glas Thulachan.
- C. flacca*, *Schreb.* (*C. glauca*, *Scop.*), ascends to 2500 feet in H. Isla. var. *stictocarpa*, *Druce.*—Creag-an-Lochain.
- C. pilulifera*, *L.*, ascends to 2800 feet on Glas Thulachan. A bracteate form is not uncommon on the higher hills. A small form, named var. *adusta* by F. A. Lees in "Report of Record Club," was gathered by me.
- C. flava*, *L.*, ascends to 3000 feet in Breadalbane.
var. *pumila*, *Anders.*—Ben Lawers, Ben Heasgarnich, Ben Laoigh.
var. *lepidocarpa* (*Tausch.*).—Ben Lawers, *teste* Pfarrer Kükenthal.
- C. flava* × *Æderi*.—Ben Laoigh.
- C. fulva*, *Good.* (*C. Hornschuchiana*, *Hoppe.*).—Lochan-na-Lairige with *C. xanthocarpa*, *Dégl.*; also on Ben Heasgarnich.
- C. binervis*, *Sm.*, ascends to 2700 feet on Glas Thulachan.

- C. obtusangula*, *Ehrh.*, ascends to 1400 feet in H. Isla.
- C. vesicaria*, *L.*, var. *alpigena*, Fries.—On Ben Lawers.
var. *dichroa*, Anders.—Ben Lawers, Ben Laoigh.
- Anthoxanthum odoratum*, *L.*, ascends to 3000 feet in H. Isla.
- Phleum alpinum*, *L.*—Ben Heasgarnich. It ascends to 2500 feet in Breadalbane.
- Agrostis canina*, *L.*, ascends to 2800 feet on Glas Thulachan.
- A. nigra*, *With.*—In cultivated fields, Lawers.
- A. alba*, *L.*, var. *maritima*, is recorded by E. F. Linton from the river Dochart at Killin in "Journ. Bot.," 1892, p. 150.
- A. alba*, *L.*, var. *coarctata* (Hoffm.), forma *aristulata*, Hackel, *in litt.*, with very short dorsal awn, occurred on Ben Lawers at about 3000 feet.
- A. pumila*, *L.*, occurred on Ben Lawers, Meall Garbh, at Lochan-na Lairige, and on Glas Thulachan in an undiseased condition, and was plentiful on Ben Laoigh, descending to 800 feet or less.
- Deyeuxia neglecta*, *Kunth*, var. *borealis*, is, I am afraid, irreparably lost at Killin, as the marsh is now entirely filled up with sawdust.
- Deschampsia cæspitosa*, *Beauv.*, var. *alpina*, Gaud.—Ben Heasgarnich, Glas Thulachan, etc.
var. *brevifolia* (sub. *Aira*).—Killin, Herb. Parnell, in the Linnean Society.
var. *longi-aristata* (sub. *Aira*).—Ben Lawers, Herb. Parnell, on Ben Lawers.
- D. alpina*, *Beauv.*—Ben Heasgarnich. In specimens from this mountain several gradations could be traced in the position of the awn on the flower-glume. In *D. alpina* they spring from above the middle of the pale. Glas Thulachan?
var. *vivipara* (sub. *Aira*).—Ben Lawers, Herb. Parnell.
- D. flexuosa*, *Trin.*, ascends to 3100 feet on Glas Thulachan.
var. *voirlichensis*, Melvill, Ben Heasgarnich.
- Arrhenatherum precatorium*, *Beauv.* (*A. avenaceum*, var. *bulbosum*, Lindl.).—In the "Flora of Perthshire" it is said to be common in cultivated ground. It is certainly also frequent in dry, rocky, and uncultivated ground, as at Lawers, etc.; but the point I wish to make is that the essential differences are not caused by growing in cultivated ground, as the statement in the "Flora" appears to suggest.
- Molinia varia*, *Schrank* (*M. cærulea*, Moench), var. *breviramosa*.—Glas Thulachan.

- Poa annua*, *L.*, var. *supina* (Schrad.).—On Glas Thulachan at 3000 feet, and on Ben Lawers at 3500 feet, Ben Heasgarnich, and Ben Laoigh.
- P. alpina*, *L.*—On Ben Heasgarnich. Recorded by Mr. Stewart in Light. "Fl. Scotica" (1777), p. 96, on the side of Craig-Challeach above Finlarig.
- P. glauca*, *Sm.*, has now disappeared from the locality near Lawers, at a low elevation, to which it was carried down by water or wind. It is a characteristic plant of Ben Lawers, which is curiously omitted from the list of localities given in the "Flora of Perthshire."
- P. cenisia*, *All.*, var. *flexuosa* (*Wahl.*).—I think it will be safer to withdraw this name, notwithstanding it was passed by Mr. Fisher as well as by Professor Hackel. This *Poa* differs by its leaf characters from both *P. pratensis* and *P. flexuosa*, but until it has been more completely studied it will be well to defer naming.
- P. Balfouri*, *Parnell.*—Ben Lawers, Herb. Parnell, with var. *rigida*, Parnell. On Ben Laoigh a form approaching *P. nemoralis* also occurs. *P. Balfouri* is recorded from Ben Voirlich in "Ann. N. H. S.," 1842, p. 122.
- P. nemoralis*, *L.*, var. *montana*, *Gaud.*—Ben Laoigh, and a form approaching it on Creag-an-Lochan.
- P. pratensis*, *L.*, var. *humilis* (*Ehrh.*).—On Ben Heasgarnich, Ben Laoigh, and Ben Lawers. A very interesting variety, which appears to be an alpine form of *P. subcaerulea*, *Smith.*
- Panicularia fluitans*, var. *subspicata* (*Glyceria fluitans*).—Under the name of *Poa fluitans*, var. *subspicata*, Parnell, from Perthshire, is contained in Herb. Parnell.
- Festuca elatior*, *Linn.*, var. *intermedia*, *Hackel* ("Monograph," p. 151).—On the shingle bordering Loch Tay, at Ardtalnaig, opposite Lawers, this variety, which is an approach to *arundinacea*, occurred. It has not been previously recorded as British. It is known from Northern Europe.
- Festuca sylvatica*, *Vill.*—Under the name *Poa sylvatica*, var. *subaristata*, Parn., there is a form of this plant from Perthshire in Herb. Parnell.
- Festuca rubra*, *L.*—From 3900 feet on Ben Lawers, 3200 feet in Isla, and 3200 feet on Ben Heasgarnich.
 var. *barbata* (*Hackel*), Ben Lawers, Ben Heasgarnich, and Glas Thulachan.
 var. *grandiflora* (*Hackel*), Ben Lawers, Ben Laoigh.

A form of *F. rubra*, labelled "*F. duriuscula*, var. *humilis*, from Perthshire," is contained in Herb. Parnell. There is also a var. *caesia* in the same Herbarium.

F. ovina, *L.*, var. *vivipara*, Parnell.—Perthshire, Herb. Parnell.
var. *tenuifolia*, Killin.—Herb. Parnell.

Cryptogramme crispa, *R.Br.*, ascends to 2900 feet on Glas Thulachan.

Lomaria spicant, *Desv.*, ascends to 3000 feet in H. Isla.

Asplenium viride, *Huds.*, ascends to 2200 feet in H. Isla.

Woodsia hyperborea, *R.Br.*, still occurs on Ben Lawers and Creagan-Lochain; and is recorded from Corrie Ardran by the Rev. E. F. and W. R. Linton.

Aspidium Lonchitis, *Sw.*—Luxuriant on Glas Thulachan, ascending to 2800 feet.

Lastræa Oreopteris, *Presl (Dryopteris montana, Kuntze)*, ascends to 3000 feet on Glas Thulachan.

L. æmula, *Brack. (Dryopteris æmula)*.—See "Journ. Bot.," 1893, p. 235, E. S. Marshall.

L. dilatata, *Presl (D. dilatata, A. Gray)*.—A form approaching Moore's *lepidota* has been sent me from Aberfeldy by Mr. W. H. Forbes of Balliol College, Oxford.

L. Filix-mas, *Presl, Dryopteris Filix-mas, Schott*, var. *abbreviata*.—Glas Thulachan.

Pseudathyrium alpestre, *Newm.*, ascends to 2900 feet on Glas Thulachan. New to H. Isla. Ben Heasgarnich.

Equisetum sylvaticum, *L.*, var. *capillare* (*Hoffm.*).—In several places in Glen Shee, etc.

Lycopodium alpinum, *L.*, var. *decipiens* (*Syme.*).—Glas Thulachan, Ben Laoigh, Ben Heasgarnich. Herr Freyn considers this to be distinct from *alpinum*. It is the *L. complanatum*, var. *fallax*, Čelak of Baenitz, "Herb. Europ."

L. Selago, *L.*, ascends to 2800 feet in H. Isla.

Isoetes lacustris, *L.*—Fine specimens in Lochan-a-Chait, submerged in at least six feet of water this dry season.

Nitella opaca, *Ag.*—Luxuriant in the stream running into Loch Lyon. A depauperated form in Lochan-a-Chait, with *Chara fragilis*.

Carex helvola.—A specimen from Ben Lawers, collected by Robert Brown in 1794, is contained in the British Museum Herbarium.

My further notes on *Hieracia*, *Euphrasia*, etc., are postponed for a time, until Mr. Hanbury and Professor Wettstein have examined my specimens.

EIGHTEENTH CENTURY RECORDS OF
SCOTTISH PLANTS.

Communicated by Professor I. B. BALFOUR, M.A., M.D., F.R.S.

(Continued from p. 174.)

June	1. <i>Lolium perenne</i> .	In every meadow.
	2. <i>Lithospermum arvense</i> .	At Stock bridge as you cross the mill burn.
	<i>Galium aparine</i> .	Among corns by waysides.
	<i>Malva sylvestris</i> .	South side of the Castle hill.
	<i>Valeriana locusta</i> .	Salisbury Craigs.
	<i>Geranium robertianum</i> .	Do.
	<i>Cucubulus behen</i> .	By the road side as you pass Provost Drummonds Park.
	<i>Thlaspi arvense</i> .	A little below Stock bridge by the mill burn side.
	<i>Pastinaca sativa</i> .	On the breas west from Crail in Fife.
	<i>Viola lutea</i> , Hud.	On Bredfoord hill east side thereof.
	<i>Lychnis viscaria</i> .	On Duddingstown Craigs.
	<i>Astragalus arenarius</i> .	At Do.
	<i>Rosa arvensis</i> .	At Do.
	<i>Geranium sanguineum</i> .	On Salisbury Craigs.
	<i>Cistus helianthemum</i> .	On Do.
	<i>Asplenium adiantum nigrum</i> .	On the rocks of Duddingstown Craigs.
	„ <i>ruta muraria</i> .	On Do.
	3. <i>Aira cespitosa</i> .	In woods.
	<i>Dactylis glomeratus</i> .	In meadows and by way sides.
	<i>Aira cristata</i> .	Salisbury Craigs.
	<i>Avena flavescens</i> .	Do.
	<i>Thymus serpyllum</i> .	Do.
	<i>Ervum soloniense</i> .	Do.
	<i>Trifolium pratense</i> .	By way sides and in corn fields.
	<i>Hieracium auricola</i> .	Salisbury Craigs.
	<i>Sonchus oleraceus</i> .	By way sides.
	„ „ var. γ	By the road side along Duddingstown Craigs.
	<i>Rumex crispus</i> .	By way sides, etc.
	<i>Oenanthe crocata</i> .	In a ditch near the road from Jocks lodge to Restalrig.

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| Potomageton crispum. | Duddingstown Loch. |
| Calitriche verna. | In a ditch at the north side of the Castle. |
| 4. Geranium lucidum. | Upon the Castle hill north side of the Castle. |
| Festuca fluitans. | In the north loch. |
| Scandix anthriscus. | By Leeth walk. |
| Brassica orientalis. | On the Castle hill north side. |
| Scandix odorata. | On the other side of the water opposite to Capt. Ranies house. |
| Polygonum aviculare. | Castle hill south side near the bottom at the road side. |
| 5. Vicia sylvatica. | On Salisbury Craigs. |
| Hyoscyamus niger. | On the Cart road side that leads up Salisbury Craigs. |
| Salvia verbenaca. | On Do. |
| Avena fatua. | On Salisbury Craigs. |
| „ flavescens. | On Do. |
| Briza media. | On Do. |
| Aira cariophyllea. | On Do. |
| 6. Lemna trisulca. | In loch-end Loch. |
| Geranium dissectum. | A little below Stock bridge by the mill burn side. |
| Chrysanthemum leucanthemum. | In the Gallows Park in the sandy brea. |
| Bunias cakile. | By the sea side east from Leeth. |
| Arenaria peploides. | By Do. |
| Scandex pecten. | Among corns frequently. |
| Hieracleum sphondelium. | By the way side in many places. |
| Carex vesicaria. | In marshy places. |
| „ saxatilis. | In the Kings Park dry ground. |
| Rhinanthus crista galli. | At Duddingstown Craigs below the foot road. |
| Medicago lupulina. | |
| Sedum villosum. | In a marsh at or rather near Cliverhall south of Edinburgh. |
| Veronica montana. | In groves and moist places of Achendenny wood and elsewhere. |
| Geranium sylvaticum. | In Achendenny wood and almost every other wood. |
| Plantago lanceolata. | In pastures almost every where. |
| Juniperus communis. | Below Achendenny wood by the water side. |
| Stellaria graminea, var. | At the new well. |

<i>Trollius europaeus.</i>	In Achendenny wood scarce, but not so in the meadows at Whitburn.
<i>Eriophorum vaginatum.</i>	In a marsh off the high road from Achendenny.
<i>Scirpus cespitosus.</i>	In a marsh near the Dams not far from the Roslin road.
<i>Juncus conglomeratus.</i>	On the Links going to Musselburgh.
<i>Betula alba.</i>	In woods.
<i>Spergula arvensis.</i>	Among bud corns on moist ground, and by the way sides.
<i>Veronica scutellata.</i>	In a ditch at mire side.
<i>Ranunculus flammula.</i>	In many marshes.
<i>Melampyrum sylvaticum.</i>	In almost all woods.
8. <i>Veronica officinalis.</i>	At Dudingstown Craigs above the foot road.
<i>Galium montanum.</i>	In the Kings Park.
<i>Aegopodium podagraria.</i>	By way sides. ¹
<i>Aphanes arvensis.</i>	Kings Park. ²
<i>Digitalis purpurea.</i>	On the south side of Bredfoordhill near the Hermitage.
<i>Sinapis nigra.</i>	Among corns.
„ <i>arvensis.</i>	Do.
<i>Raphanus raphanistrum.</i>	Do.
9. <i>Pedicularis palustris.</i>	In a ditch below Dudingstown Craigs.
<i>Lychnis flos cuculi.</i>	In a marsh hard by the Dukes walk.
<i>Antirrhinum linaria.</i>	
<i>Urtica dioica.</i>	
<i>Plantago maritima.</i>	By the sea side east from Leeth.
„ <i>coronopus.</i>	By Do.
10. <i>Papaver argemone.</i>	
<i>Daucus carota.</i>	By road sides. J. H. ³
<i>Papaver rhoeas.</i>	Among corns.
„ <i>dubium.</i>	Do.
11. <i>Cerastium viscosum.</i>	By the sea side east from Leeth.
<i>Poa annua.</i>	
„ <i>trivialis.</i>	
„ <i>aquatica.</i>	A little above Leeth by the water side.
<i>Phalaris arundinacea.</i>	

¹ In Dr. Hope's writing.² *Idem.*³ *Idem.*

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| 12. <i>Scabiosa arvensis</i> . | At the water of Leeth by the Road side. |
| <i>Valeriana officinalis</i> . | On Salisbury Craigs. |
| <i>Tragopogon pratense</i> . | By the water of Leeth up from the new well by ye road side. |
| <i>Silene noctiflora</i> . | At Provost Drummonds Park wall by the road side. |
| <i>Avena elatior</i> . | Among corns. |
| „ <i>sativa</i> . | |
| <i>Bromus sterilis</i> . | |
| „ <i>secalinus</i> . | |
| „ „ <i>hor-</i> | |
| „ „ <i>deaceus</i> . | |
| <i>Phleum nodosum</i> . | |
| „ <i>pratense</i> . | |
| 13. <i>Fucus nodosus</i> . | Upon the stones and rocks on the sea shore. |
| „ <i>serratus</i> . | On Do. |
| „ <i>exissus</i> . | On Do. |
| „ <i>vesiculosus</i> . | At the foot of Cramond water. |
| „ <i>filum</i> . | In Pretycur harbour. |
| „ <i>siliquosus</i> . | In cavern of the rocks of the sea at Dunglass. |
| „ <i>pinnatifidus</i> . | On Leeth sands. |
| „ <i>spinosus</i> . | On Do. |
| „ <i>saccaratus</i> . | On Do. |
| <i>Rosa villosa</i> . | At Stannis mills, Duddingstown Craigs and Lochend. |
| <i>Hipurus vulgaris</i> . | In a marsh at Mire side. |
| <i>Triglochin palustre</i> . | Do. |
| <i>Rubus caesius</i> . | By Musselburgh water above the bridge some way. |
| <i>Iris pseudacoris</i> . | In the marsh at Mire side. |
| <i>Aquilegia vulgaris</i> . | In Collingtown wood south side of the water. |
| <i>Arenaria trinervia</i> . | In Collingtown wood, marshy places. |
| <i>Anchusa sempervirens</i> . | In Dunglass Den most plentifully. |
| <i>Carum carvi</i> . | By Leeth walk. |
| <i>Cerastium tomentosum</i> . | In Collingtown wood on a rock. |
| <i>Erica cinerea</i> . | In Collingtown wood. |
| <i>Salix pentandria</i> . | In Do. |
| <i>Carex hirta</i> . | In a marsh south of Craig-lockhart. |

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| <i>Urtica urens.</i> | By a wall side on the Calton-hill. |
| <i>Alopecurus pratensis.</i> | |
| „ <i>geniculatus.</i> | |
| <i>Aira coerulea.</i> | |
| „ <i>aquatica.</i> | |
| 14. <i>Epilobium montanum.</i> | At the well. |
| <i>Symphytum officinale.</i> | By a rivulet without the Kings
Park, yt runs from a marsh at
the Dukes road. |
| <i>Spiraea ulmaria.</i> | By the water of Leeth near the
new well. |
| <i>Scrophularia nodosa.</i> | On Salisbury Craigs. |
| <i>Saxifraga punctata.</i> | In Collingtown wood north side
of the water. |
| <i>Iris germanica.</i> | At Red Hall Bridge upper and
nearer side. |
| <i>Athamanta meum.</i> | At Do. |
| <i>Erica tetralix.</i> | |
| <i>Melica nutans.</i> | |
| 15. <i>Rosa canina.</i> | |
| <i>Lonicera caprifolium.</i> | In Collingtown wood, north side
of the water. |
| <i>Rumex.</i> | |
| <i>Turritis hirsuta.</i> | On Salisbury Craigs. |
| <i>Orchis latifolia.</i> | In the hunting-bog. |
| <i>Rubus Idaeus.</i> | On Salisbury Craigs. |
| <i>Poa rigida.</i> | |
| „ <i>pratensis.</i> | |
| 16. <i>Alisma ranunculoides.</i> | In a ditch at a marsh near mire
side. |
| <i>Orchis mascula.</i> | In meadows. |
| „ <i>morio.</i> | |
| <i>Ceratophyllum demersum.</i> | In a ditch by a marsh at mire
side. |
| <i>Juncus pilosus.</i> | In Achendenny wood. |
| „ <i>sylvaticus.</i> | In Do. |
| <i>Medicago falcata.</i> | |
| <i>Vicia cracca.</i> | |
| <i>Viburnum opulus.</i> | A very little below Achendenny
bridge. |
| <i>Melampyrum sylvaticum.</i> | In Achendenny wood. |
| <i>Empetrum nigrum.</i> | In Do. but more
frequently in heathy grounds. |
| <i>Hieracium murorum.</i> | On Salisbury craigs. |
| <i>Prunus padus.</i> | In Achendenny wood. |

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| <i>Ligustrum vulgare.</i> | A little above Roslin in a thicket
by the water side. |
| <i>Polytrichum vulgare.</i> | On Pentland hills & Arthurs seat. |
| <i>Stachys sylvatica.</i> | |
| <i>Polygonum bistorta.</i> | By the water side a little up from
Le-Swede in a meadow. |
| <i>Achillea millefolium.</i> | |
| 17. <i>Arenaria serpyllifolia.</i> | |
| <i>Plantago major.</i> | |
| <i>Iris siberica.</i> | Immediately above Red Hall
Bridge. |
| „ <i>Germanica.</i> | At Do. |
| <i>Erica vulgaris.</i> | |
| <i>Veronica arvensis.</i> | |
| 18. <i>Pyrola rotundifolia.</i> | In Achdenny wood. |
| <i>Anthemis nobilis.</i> | In a field at the Mill-town near
Achendenny and above the
Bleach field near Mavis B. |
| <i>Festuca ovina.</i> | |
| „ <i>duriuscula.</i> | |
| 19. <i>Potomageton serratum.</i> | |
| <i>Festuca elatior.</i> | |
| „ <i>loliacea.</i> | |
| „ <i>sylvatica.</i> | |
| 20. <i>Alisma plantago.</i> | In the ditches of the Meadow. |
| <i>Trifolium arvense.</i> | On Duddingstown Craigs. |
| <i>Hypericum perforatum.</i> | By the Water of Leeth near the
new well. |
| „ <i>quadrangulum.</i> | At Do. |
| 21. <i>Jungermannia Tamarisifolia.</i> | In the Kings Park & Castle Hill
on moist rocks. |
| <i>Lichen caninus.</i> | In the Kings Park. |
| „ <i>centrifugus.</i> | In Do. on the stones. |
| „ <i>flavescens.</i> | In Do. on Do. |
| „ <i>palescens.</i> | Do. |
| „ <i>piscidatus.</i> | Do. |
| 22. <i>Conferva gelatinosa.</i> | |
| „ <i>bulbosa.</i> | |
| 23. <i>Ulva umbilicalis.</i> | On stones within the sea mark. |
| „ <i>intestinalis.</i> | On Do. at Do. |
| „ <i>compressa.</i> | Do. |
| 24. <i>Lichen parietinus.</i> | On old walls and trunkis of
trees. |
| „ <i>farinacius.</i> | |
| „ <i>fraxineus.</i> | On Ash Trees. |

	Lichen miniatus.	On the rocks of the Castle Hill as also of the Kings Park.
26.	Chara vulgaris.	In a ditch at a marsh near mire side.
	„ hispida.	In and at Do.
27.	Fontinalis squamosa.	With the two former.
	Polytrichum subrotundum.	On stones in the Kings Park.
July	1. Polygonum persicaria.	
	Achillea ptarmica.	
	Trifolium medea.	
	Epilobium hirsutum.	
	Carduus acanthoides.	
	3. Centaurea cyanus.	Among corns.
	Chrysanthemum segetum.	With Do.
	Cardamine amara.	At the Water of Leeth near the new well.
	Nymphaea alba.	In Lochend Loch.
	„ lutea.	In Do.
	Potamogeton lucens	In Do.
	Artemisia vulgaris.	Among corns.
	Typha latifolia.	In Lochend Loch.

(To be continued.)

ZOOLOGICAL NOTES.

Great Gray Seal at Cumbræ.—On the forenoon of Saturday, 8th September last, in company with Mr. W. Wallace, B.Sc., St. Andrews, and while dredging off the old castle, island of Little Cumbræ, I had the pleasure of seeing a magnificent specimen of the Great Grey Seal (*Halichærus gryphus*) rise to the surface within less than thirty yards of our boat. It remained on the surface for at least five minutes, watching all our movements just as closely as we watched it, and seemed to have no fear of us. We could distinctly see its eyes and the gray mottled fur of its head and neck as it leisurely turned its head from side to side, following our every turn, apparently quite oblivious of its own safety. It was probably a solitary animal, as we saw no companion; but the same individual appeared twice again, close inshore, within the next quarter of an hour. It was seen later on the same afternoon by another boating party, about two miles farther east on the opposite (Ayrshire) coast. The last local record I have of the animal is from the little island

of Sanda, off the south end of Kintyre, about forty years ago. If the too eager "sportsman of kind" could resist the temptation of shooting at such rare visitors when they do come our way, there might still be some chance of them taking up their abode in Clyde waters again.—ALEXANDER GRAY, Curator, Marine Biological Station, Millport.

The White-beaked Dolphin (*Lagenorhynchus albirostris*, Gray) **in Bute, with Remarks on the Dolphins of the Clyde Waters.**—In November last Mr. John Robertson found, cast up on the beach, about a mile north of St. Ninian's Bay, Bute, the carcase of a small cetacean, of which he wrote me at the time that "it was rather badly mangled, the tail and lower jaw being awanting. . . . The length as it lay was about 7 feet, but doubtless in life it would be another 18 inches or 2 feet longer." In June Mr. Robertson and other members of the Andersonian Naturalists' Society recovered the skull and sternum, well cleaned by nature, and sent them to me to be identified and shown at a meeting of the Society. I made the species to be the above named, an identification which has been very kindly confirmed by Professor Sir Wm. Turner, with whom the skull has been left to be placed in the Anatomical Museum, Edinburgh. This museum has already a skull of this species from the Clyde, from an animal shot by Mr. J. Y. Buchanan in Kilbrannan Sound in September 1879, as recorded by Sir Wm. Turner ("Proc. Roy. Phys. Soc. Edin.," 1891, x. p. 14), who further states that he saw in these waters, in August 1887, what he believed to be a school of the White-beaked Dolphin. It may be repeated here that we claim this Clyde specimen (obtained by Mr. Buchanan) as the first authentic record of the species in Scottish waters, as it ante-dates by one year the example obtained near the Bell Rock ("Zoologist," 1881, pp. 41-44), and which Messrs. Southwell ("Seals and Cetaceans of the British Seas," 1881, p. 127) and Lydekker ("British Mammalia," 1896, p. 293) erroneously state to be the first from Scotland. In the Kelvingrove Museum, Glasgow, were four examples of this species (a stuffed specimen and three skeletons, one being a foetus), all from Kilbrannan Sound, captured in 1894 and 1895 ("Zoologist," 1894, pp. 424-426, and "Glasgow Herald," 7th September 1895). These occurrences seem to indicate that the animal so well known in the waters of the Firth of Clyde as the "bucker," and in Loch Fyne as the "stinker," is identical with this species. Fishermen and yachtsmen clearly distinguish it from the Porpoise by its larger size and by its conspicuous habit of leaping out of the water; by the Loch Fyne men this is said to be "the stinkers threshing." I have seen a school of about a dozen in the shallow waters of Whiting Bay, playing and gambolling round the ferry-boat, throwing themselves well clear of the water and falling back again with a resounding splash, a fine

sight in the bright sun of a summer day (August 1897). Dr. James Dunlop, who presented the specimens above named to the Kelvingrove Museum, states that White-beaked Dolphins are to be seen daily in Kilbrannan Sound, where several other species of Dolphin also occur ("Glasgow Herald," 7th September 1895). So far as I know, the following are the only statements with any specific value regarding our other Clyde Dolphins. (1) *Lagenorhynchus acutus* (White-sided Dolphin), an example captured at Ardrishaig, as recorded in the "Vertebrate Fauna of Argyll and the Inner Hebrides," 1892, p. 29. (2) Mr. F. Gordon Pearcey, Naturalist to the Scottish Fishery Board, informs me that on 14th September 1898 he saw a large school of *Delphinus delphis* (?) between Ardlamont and Skipness points; and there is in Rothesay Museum a skull labelled "Porpoise from Mr. A. M'Kirdy," but which I believe to be this species, the Common Dolphin, as the skull is about 24 inches in length, and has about 190 teeth. (3) The "New Statistical Account" (vii., 1845, p. 439) states that the Great Dolphin (*Delphinus tursio*), from 12 to 15 feet in length, and with a pointed muzzle or beak, frequents the coast of Saddell and Skipness during the herring-fishing season; and in the Anatomical Museum, Edinburgh, are the skull and ear-bones of an example of this species shot in August 1879 in Loch Long by Dr. D. Noel Paton. It will be seen that a satisfactory determination of at least one of the species is still awaiting. Further information may also show that the name "bucker" is applied to more than one species, and it may be noted that the "Old Statistical Account" (v., 1793, p. 535), under Glasgow, mentions the Grampus or Bucker, *Delphinus orca*. I may further say that I have made inquiry regarding the skulls in the Hunterian Museum referred to by Mr. Wm. Taylor (*ante*, p. 68), and while I am told it is certain that they are from the Clyde area (obtained about thirty years ago), yet in the absence of any data (quite a characteristic of this museum) it is impossible to accept this statement, more particularly as there is no record of the occurrence of *Prodelphinus* in British waters. One of the skulls, labelled *Delphinus delphis*, has a business card (E. Gerard . . . Pimlico) attached to it bearing the name *Sterno* (sic) *compressus*, and the same name is written on the skull itself. *Sterno compressus*, Gray, is apparently a synonym for *S. rostratus*, Desmarest (Beddard's "Book of Whales," 1900, p. 273), and of this species there is also no British record.—HUGH BOYD WATT, Glasgow.

Ornithological Notes from Orkney.—A pair of Whimbrels (*Numenius phaeopus*) bred near Finstown on the Mainland this year, a new locality for that bird, as previously they have only been recorded from Hoy.

A flock of quite one hundred Pochards (*Fuligula ferina*) appeared on the Loch of Skail the second week in July; previously,

only a few odd birds have been recorded from that locality in summer.

Cuckoos (*Cuculus canorus*) appear to have been commoner than usual in the islands; several were noted at Binscarth.

At least two pairs of Red-necked Phalaropes (*Phalaropus hyperboreus*) bred this season on North Ronaldshay.

On 13th August Mr. C. H. Ackroyd saw a Barn Owl (*Strix flammea*) at Yesnabie near Skaill, the second time in which he has seen this bird in Orkney.—T. E. BUCKLEY, Inverness.

Chiffchaff in "Clyde."—The editor's note in the "Annals" for July on the occurrence of the Chiffchaff (*Phylloscopus rufus*) in Midlothian and the paucity of records for that county recall to me that since I published an account of the distribution of this species in "Clyde" ("Trans. Nat. Hist. Soc. Glasgow," v. (N.S.), pp. 48-52) some additional information has come to hand which may be recorded. I had overlooked an interesting reference of Mr. Gray's in Bryce's "Geology of Arran," etc. (1872 ed.), where he says (p. 299), "I have seen and shot the Chiffchaff in the Cumbrae Islands." Mr. Wm. Evans tells me regarding my reference to its occurrence at Dundonald in Ayrshire,² that he heard it there in 1884. In the same county the following localities are new: Barr (April 1898, *fide* Mr. Hugh Boyd Watt); Lady Glen, Kilkerran (several, April 1898); Ballochmyle (two heard, May 1898), and a little farther down the Water of Ayr, on the same occasion, one, at Barskimming; in the village of Fairlie, one (June 1899); from Lendalfoot Mr. Chas. Berry reports them "very plentiful" in April 1900. Localities indicated by Dr. Fullarton, Lamlash, for Arran, in notes relating to the arrival of summer birds, are Auchenhew, Kildonan (April 1898), Glenree (April 1899), and Moniemore (April 1900). Mr. John Robertson found it in two or three places about Mountstuart, Bute, in June 1899. In a list of birds of Queen's Park and Camphill (1893) by the late Mr. A. A. Thomson, for a copy of which I am indebted to Mr. J. M'Naught Campbell, it is entered with the letter "f," indicating a few. The most interesting occurrence of all is perhaps that of a pair of males calling in Cleghorn woods, near Lanark, on the 16th of June this year, the first time I have heard it anywhere in Lanarkshire. The country between Lanark and Hamilton is rich in sylvan bird-life, but the Chiffchaff has apparently not been known to occur there hitherto. In Dumbartonshire, Mr. Harold Raeburn heard it at Shandon (1894), as I learned from Mr. W. Evans; and in the course of a walk in the first week in June this year, with Mr. John Robertson, from Balloch to Luss, we heard it at two or three places.—JOHN PATERSON, Glasgow.

Hybrid Capercailie and Blackcock.—I saw in Mr. Mackay's shop a very fine specimen of this cross, a male bird, which had been

sent in for preservation by Mr. J. N. H. Grant, Carron House, Carron, Strathspey.—T. E. BUCKLEY, Inverness.

Great Snipe in Stirlingshire.—On the 15th of this month (September), when driving grouse on the Denny Hills, a Great Snipe (*Scolopax major*) flew past, but scarcely within range. The large size and the woodcock-like flight made it easily recognisable. This is the second time I have seen the Great Snipe upon this same ground; but the previous observation I did not record, because I was not perfectly certain of its identity. It was too far off from me to make me feel sure of it.

The question arises:—Is the Great Snipe a regular migrant to parts of this country, or only occasional? From what I have heard, though not seen, in Shetland, I am inclined to think that the Great Snipe comes with some amount of regularity to the south end of Shetland, but only remains a very short time before resuming its journey.

I may mention, in case any one may feel inclined to doubt my ability to identify the Great Snipe on the wing, that I have had plenty of experience of them both in Norway and in Russia, and have seen them and shot them, *plentifully*, when they certainly belied their name of *Solitary*, as *hundreds* arrived *en masse* at their breeding-places, and scores were seen dropping down out of the main flight, amongst the willow scrub of the delta.—J. A. HARVIE BROWN.

The Protection of the Great Skua in Shetland.—In June last the Society for the Protection of Birds received information that eleven clutches of the eggs of the Great Skua, taken in 1899, were to be sold by auction in London on the 20th of that month. The only known breeding-places of this bird in the British Isles are on Foula and Unst, outer members of the Shetland group, and in 1891 the then owners of both islands, Mr. Scott of Foula and Mrs. Edmondston of Unst, were awarded the Silver Medal of the Zoological Society for many years' protection of the breeding-grounds. As there was reason to believe that the eggs in question came from Foula, letters were immediately sent to the present owner, Mr. Ewing Gilmour, to Mrs. Traill, to the Scottish Office, to the Zetland County Council, and to a number of gentlemen likely to give information and assistance, the Society offering to bear the expense of a watcher if necessary. The replies received show that the present proprietor is equally anxious with his predecessor to preserve the birds. At the request of the Society, Mr. H. Nugent Colam also undertook to visit Foula and investigate the matter; and leaving London on 25th June he reached that distant spot on the 29th. Mr. Colam, who carried out his part of the work with much energy and tact, reports that, so far as he could tell, there was no attempt being made to watch the nests at the time of his visit, but the egg season was then practically over and the young

birds hatched. Our representative's attempts to buy Great Skua eggs from the crofters altogether failed, as they were far too cautious to commit themselves with a stranger, even if concerned in the business; and they stated that if caught taking eggs they would be turned out of their crofts, which would mean ruin. They are, however, extremely poor, so that the temptation to take eggs, if offered high prices by dealers and collectors, must be great. At a general merchant's shop on the Mainland Mr. Colam was able to buy an egg, one of three in the dealer's possession, said to be left from last year, being told at the same time that no more could now be got as they were protected. (The Shetland Order, under which the Great Skua and its eggs are scheduled, was issued in December 1898.) This was very possibly one of the same batch with those offered for sale in London. As a result of the agitation, and the interest aroused by it, steps will be taken next year by Mr. Gilmour and Mrs. Traill to have the breeding-ground systematically and thoroughly watched; and it is satisfactory to add that a Branch of the S.P.B. has been started in the Shetlands, with Mrs. Bruce of Sunburgh as Honorary Secretary. In the course of the inquiry attention was drawn to the destruction of both Skuas and Gulls in the neighbouring waters by French fishermen, who use them as bait; and the Society has had pleasure in making an award to the skipper and crew of the Shetland vessel the "Catherine" for their humanity in releasing a Great Skua which had been tethered as a decoy.—Communicated by THE SOCIETY FOR THE PROTECTION OF BIRDS.

[We desire to bring under the notice of our readers this excellent Society. It is doing really good work, and is deserving of the support of all who are interested in birds. The Honorary Secretary is Mrs. Lemon, 3 Hanover Square, London, W.—EDS.]

Occurrence of the Long-finned Tunny off the Orkney Islands.

—Mr. Thomas Scott has called our attention to a paragraph in the "North Western Daily Mail" of 16th June last, wherein it is recorded that a specimen of this fish, weighing 42 lbs., was captured by one of the herring fleet off the Orkneys, and was acquired by the Hon. Walter Rothschild for his museum at Tring. Mr. Ernst Hartert, the Director of the Tring Museum, has kindly confirmed the correctness of this newspaper statement as to the fish being a specimen of the Long-finned Tunny (*Thynnus alalunga*), or Germon, or Albacore, as it is variously known. This species is a native of the Mediterranean and tropical Atlantic, and is a straggler to the British seas, being rare even on the south-western coast of England; while for Scotland, Day, in his "British and Irish Fishes," gives no record for Scottish waters.—EDS.

The occurrence of *Labrax lupus* at the Bay of Nigg, near Aberdeen.—A specimen of the Basse (*Labrax lupus*) was obtained from salmon fishers at Bay of Nigg on 31st July. The specimen

measured 13.75 ins. in length, and is the only one observed here during the past season. It was caught in one of the salmon-nets in the Bay of Nigg.—T. SCOTT, Aberdeen.

The occurrence of *Mugil chelo* in the Bay of Nigg, near Aberdeen.—Four specimens of this Mullet have been obtained from salmon fishers at the Bay of Nigg during the present summer. Two of them were captured on 20th June, one on 14th July, and the other on 30th July. The specimens measured about 14 to 15 ins. in length. The stomachs of three of the specimens contained scarcely anything in the way of food, and the little they did contain consisted of minute algæ. The stomach of the fourth specimen was moderately full, and the food consisted of the same kind of algæ, but the remains of no other organisms could be detected.—T. SCOTT, Aberdeen.

The occurrence of *Clupea alosa* in the Bay of Nigg, near Aberdeen.—A specimen of the Allis Shad was obtained from salmon fishers at the Bay of Nigg, on 17th August. It had been captured in the salmon-nets. The specimen measured 20 ins. in length, and weighed 2 lbs. 6.25 ozs. The stomach of the specimen was crammed with copepods, almost all of them belonging to the one species, *Temora longicornis*—a species which at times is very common in the sea. The contents of the stomach filled a 4 oz. bottle, and appeared to consist entirely of copepods; for, though carefully examined, nothing else could be detected. It may be noted that this specimen of *C. alosa* was ornamented on each side with a row of somewhat indistinct dark-coloured spots, each row of spots extending from the shoulder to the base of the caudal fin, and to the casual observer the specimen might have been taken for a Twaite Shad; the spots, however, were too numerous for that species; and besides the number and character of the rakers on the outer gill-arches left no doubt as to the specimen being an Allis Shad.—T. SCOTT, Aberdeen.

Insect Notes from Solway.—We have again had a visitation of the Death's-head Moth (*Acherontia atropos*) in the form of larvæ and pupa. One fine caterpillar was found feeding on potatoes near Dumfries on 23rd August. Another came to me from Hightae Moss, near Lockerbie, on 28th August. A few days later a third larva was picked up at Kirkandrews in Borgue, Kirkcudbrightshire. On 20th September I was called in to identify a fine pupa dug up at Kirkmahoe near Dumfries. These occurrences in the larval and pupal stages are of much interest, because it is only within the last few years that the species, so far as I am aware, has ever been seen in Solway otherwise than as an imago. *Sphinx convolvuli* was captured at Portpatrick on 20th August. This autumn there has been a most brilliant display of Red Admiral Butterflies. More

especially has this been the case in the larger gardens, where extensive beds and borders of flowers in bloom were available on which to flaunt their splendid colours. In one such garden, a large walled enclosure not far from Southerness, I counted on a recent occasion over 200 of these beautiful creatures. The sight was a particularly gorgeous one, and of sufficient rarity in the northern regions to be worthy of record. *Sirex juvenis* has again been much in evidence. A number of specimens were sent me from a place near Lockerbie, where they were emerging from the flooring of an outhouse. The timber had been cut from an adjoining estate. I got it from three or four other localities also. From near Moffat *Sirex gigas* was sent. A number of larch posts erected as gateways on a sheep farm had been almost destroyed by its borings. This species also has been taken all over the area of Solway this season. A small *Culex*, familiar to me for a long time past as a not uncommon insect, has this autumn become most conspicuously abundant. Some of the evenings at the end of August it was in perfect clouds. Seen against the sunset glow the distinguishing frontal appendages on the two sexes were easily noted. But it was not always easy to keep a single individual in one's eye amidst the gyrations of the dancing myriads. They are now very much scarcer with the advent of colder weather. No doubt the unusual warmth and moisture of the past summer favoured an abnormal increase. I do not venture on to the thin ice of dipterid identification, and so forward a few living examples of this *Culex* for inspection.—ROBERT SERVICE, Maxwelltown, Dumfries.

[The specimens submitted are *Culex nemorosus*, Mg.—P. H. G.]

Acherontia atropos, L., in Glasgow and Kilmarnock.—I had a specimen of this Hawk-moth handed to me on 20th September, which was taken in York Street. Its capture was effected by our Bond-keeper, Mr. Allan Livingstone, whose attention was attracted by a gentleman probing at something on the street with his umbrella. It was still alive when I received it, and, irrespective of the rather rough usage it had received, is in fine condition.

In a letter I received from Mr. George Rose of Kilmarnock, he mentioned that a live specimen of this insect had been given to him, which was found beneath the outside cover of a bar-frame hive on the 10th July last.—ANDREW ADIE DALGLISH, Glasgow.

Cleora glabraria in Roxburghshire.—On the 25th and 27th of July last I took eight specimens of *Cleora glabraria*, two ♂ and six ♀, all apparently freshly emerged. Mr. C. G. Barrett has seen all these, and he says: "There is not a shadow of a doubt about your *Cleora glabraria*: they are correct, and very beautiful and perfect specimens. The transverse lines upon their fore wings are unusually well defined and distinct." I took all the moths at rest on the trunks of Scotch fir trees. They are very lethargic in habit,

only one of them fluttering to the ground when approached, and was then quite easily secured; another I had to gently move from the bark with a feather before securing it. It is curious to notice the different degrees of alertness in different species; for while *Cleora glabraria* and *Venusia cambrica* almost invariably remained immovable, *Larentia cæsiata* and *Ypsipetes elutata* and other common species dashed wildly away on anything like a near approach. A curious habit of *Alucita polydactyla* I noticed in May last. I saw a specimen settle on a leaf, and on nearing it, it suddenly dropped to the ground as if feigning death. This species seems to be increasing, as I took four specimens one night lately; three of them of full normal size, one abnormally small, but quite perfect. *Hydrocampa nymphæata* is another species I have lately taken, but not formerly in Roxburghshire.—A. ELLIOT, Caverton, Roxburgh.

Rare Insects at Peebles.—Last August on a bank covered with *Scabiosa succisa*, about two miles from Peebles, I had the great pleasure of taking the following uncommon Diptera: *Didea alneti*, Fln., one ♀; *Didea fasciata*, Mcq., ♂ and ♀; *Syrphus annulipes*, Ztt., five ♀; and *Sericomyia borealis*, Fln., one ♀. Beyond a couple of the common *Syrphus ribesii*, L., these were the only flies seen. Rubbed specimens of *Charæas graminis*, L., were not uncommon, and a single specimen of the very local beetle *Chrysomela marginata*, L., was taken on the wing by Mr. James Black.—ALFRED THORNLEY.

Syrphus annulipes, Ztt., and some other Diptera in the Edinburgh District.—On 30th May last I caught a female of this fly near Balerno in this county. I have shown it to Mr. P. H. Grimshaw, who says it is rightly determined. I have also a number of other good flies taken in the district, among them being the following:—

Merodon equestris, Fab.; ♂, Newbattle Terrace, Edinburgh, 6th June 1899.

Pyrophæna rosarum, Fab.; two, Aberfoyle, 27th July 1900.

Anthrax paniscus, Rossi; Leven Links, a few, August 1893; half a dozen, Tynninghame, August 1894; Gullane, ♂ and ♀, 21st July 1898; Elie, one, 24th August 1899.

Trypeta cornuta, Fab.; ♂ and ♀, Gullane, 20th July 1898.

Philonicus albiceps, Mg.; ♂, Tynninghame, August 1894; ♀, Falkland, August 1895.

Tipula lutescens, Fab.; one near Midcalder, July 1900.

Some of the above species have not, I understand, been previously recorded for Scotland, and all the specimens have been shown to Mr. Grimshaw, to whom I am indebted for the names of most of them.—WILLIAM EVANS, Edinburgh.

Salda muelleri, Gmel., in Kinross-shire and Argyll.—On the 11th of August last I captured two examples of this Hemipteron in

a peat bog near Loch Glow on the Cleish Hills, Kinross-shire (Forth area); and I find another among some insects collected by Mr. R. Godfrey at Loch Awe, Argyll, last June. Mr. E. Saunders has seen the specimens and confirms my identification. The species has been taken in some numbers near Ballinluig, by Mr. T. M'Gregor, as recorded in this magazine for 1895, and it seems also to have occurred at Aviemore and Rannoch and one or two other localities in the north of Scotland.—WILLIAM EVANS, Edinburgh.

Rhyparochromus dilatatus, H. Schf., in Perthshire.—Among some insects which I collected in Glen Farg, Perthshire, in September 1899, there is a specimen (named for me by Mr. E. Saunders) of this plant-bug. It seems to be an addition to the list of Scottish Hemiptera-Heteroptera, and in England the recorded localities for it do not extend farther north than Norfolk.—WILLIAM EVANS, Edinburgh.

Bombus soroensis, Fab., in Lanarkshire.—On 18th and 19th September I observed a number of males and a few workers of a bee which seemed new to me, visiting marsh-thistle flowers in a ravine among the hills near Elvanfoot, Lanarkshire. I thought of *B. soroensis*, and Mr. E. Saunders, to whom I have submitted specimens, says they are referable to that form. I can find no previous record of it from Scotland. I may add that *Bombus jonellus*, Kby., was common at heather on the Elvanfoot hills during the greater part of the month.—WILLIAM EVANS, Edinburgh.

Cordulegaster annulatus on the summit of Beinn Mhor, Mull.—On the 4th of June I made the ascent of Beinn Mhor, in the island of Mull, in company with Mr. A. H. Pawson, F.L.S. When at about 800 feet altitude we captured a large dragon-fly, which I sent to Mr. John Waddington of Leeds, who informs me that it is *Cordulegaster annulatus*. When at the actual summit of the mountain I noted insects flying round and above the cairn, of various orders, and at least a dozen or more species, including a large dragon-fly, apparently—in fact almost certainly—of the same species as the one I took on the slope. The day was fine and warm, of brilliant sunshine.—W. DENISON ROEBUCK, Leeds.

BOTANICAL NOTES AND NEWS.

Rubus argentatus, P. J. Mueller, in Scotland.—Both Dr. Focke and the Rev. W. Moyle Rogers agree in naming as above a Bramble I gathered near Stranraer in Wigtownshire in 1898. It is the first Scottish specimen that Mr. Rogers has seen.—G. CLARIDGE DRUCE.

Matricaria discoidea, DC., in North Aberdeenshire.—About twelve years ago I found this plant growing on the seashore beside the harbour of Rosehearty, on the Moray Firth coast of Aberdeenshire. Though rather common near the harbour, I did not observe it elsewhere; and, regarding it as a "casual," I omitted to record it. During August of this year I have met with it again. At Boddam, a little way south of Peterhead, it occurs on flat low ground on to which boats are drawn up, much like the place where I first found it, but it has not yet spread far from this centre. Near Rosehearty and Pittulie it is now extremely abundant; and it has spread along the roads inland to the old castles of Pittulie and Pitsligo, and at least nearly four miles westward, as far as Aberdour. It is especially plentiful near farm-buildings, sometimes quite covering the ground, almost to the exclusion of other vegetation. A native of eastern Asia and western North America, it has for a number of years been known as naturalised on the eastern coasts of the North Sea; and it has probably been brought by fishing craft to the Aberdeenshire ports. It is now most thoroughly naturalised on the north coast of Aberdeenshire. I am not aware of any previous record for Scotland. I have seen it on waste ground and rubbish along the Thames at Kew near London; and it is recorded ("Journ. Bot.," 1900, pp. 354-355) as abundant around Falmouth Docks.—JAMES W. H. TRAIL.

Scottish Sphagna.—In Mr. Horrell's paper on 'European Sphagnaceæ,' now appearing by instalments in the "Journal of Botany," the following are noted as from localities in Scotland, the name of the collector being added within brackets. *Sphagnum subnitens*, Russ. and Warnst., var. *pallescens*, Warnst., Gallows Hill, Cromarty (*Ogilvie-Grant*); *S. molle*, Sulliv., var. *tenerum*, Braithw., Dalfruo Bog, Kincardine (*Sim*); *S. squarrosum*, Pers., var. *spectabile*, Russ., near Loch Garve, Ross-shire (*Braithwaite*); *S. teres*, Angstr., var. *imbricatum*, Warnst., Strachan, Kincardine (*Sim*); *S. Lindebergii*, Schimp., Ben Wyvis, Ross-shire (*M. Kinley*), Unst, Shetland (*Sim*); *S. cuspidatum*, Russ. and Warnst., var. *plumosum*, Nees and Hornsch., Scotstown Moor, near Aberdeen (*Sim*); *S. recurvum*, Russ. and Warnst., Loch Knock, Islay (*Gilmour*); var. *mucronatum*, Warnst., Corriegills Head, Arran (*Ley*), Islay (*Gilmour*); *S. balticum*, Russ. (= *S. cuspidatum*, var. *brevifolium*, Lindb., in Braithwaite's "Sphagnaceæ," p. 84), Scotland, on high moors; *S. compactum*, DC., var. *imbricatum*, Warnst., Dalfruo Bog, Kincardineshire (*Sim*), Glen Dole, Clova (*Miss Barton*), Moidart, Westernness (*Macvicar*), Aviemore, Easternness (*Macvicar*).

Scottish Desmids.—In 'Notes on Freshwater Algæ, II.,' by W. West and G. S. West ("Journ. Bot.," 1900, pp. 289-299), the following changes are made in the nomenclature of certain species included in Roy and Bissett's papers which appeared in this Journal

in 1893-1894. *Cosmarium Archeri*, R. and B., is referred, as a variety, to *C. cymatopleurum*, Nordst.; *Staurostrum rostellum*, R. and B., to *S. cosmospinosum* (Börger.), W. and G. S. West; and *S. Farquharsonii*, R. and B., as a variety, to *S. hibernicum*, West.

CURRENT LITERATURE.

The Titles and Purport of Papers and Notes relating to Scottish Natural History which have appeared during the Quarter—July-September 1900.

[The Editors desire assistance to enable them to make this Section as complete as possible. Contributions on the lines indicated will be most acceptable and will bear the initials of the Contributor. The Editors will have access to the sources of information undermentioned.]

ZOOLOGY.

CUCKOO IN THE SHETLANDS. T. Edmondston Saxby. *Zoologist* (4), vol. iv. p. 426 (September 1900).—Young bird caught on 8th August in Unst, and others seen and heard many times during the summer.

OPAH AT THE SHETLANDS. T. Edmondston Saxby. *Zoologist* (4), vol. iv. p. 434 (September 1900).—Specimen caught at West Voe, Dunrossness, on 20th July.

COLIAS EDUSA IN SCOTLAND. Percy C. Reid. *The Field*, 7th July 1900, p. 41.—Specimens taken at Rannoch and in Ayrshire.

XENOLECHIA ÆTHIOPS, WESTW., IN SCOTLAND. William Evans. *Ent. Mo. Mag.* (2), vol. xi. p. 159 (July 1900).—Specimens taken on the Pentland Hills (see "Annals," 1897, pp. 89-110), and on 5th May this year near Midcalder.

XENOLECHIA ÆTHIOPS, WESTW., AND ADELA CUPRELLA, THNB., IN SCOTLAND. K. J. Morton. *Ent. Mo. Mag.* (2), vol. xi. p. 159 (July 1900).—A specimen of *X. æthiops* taken near Carluke many years ago, and also in the Edinburgh district, near Bavelaw, in May 1897; *A. cuprella* taken at Rowardennan, on Loch Lomond, in May.

DIPLODOMA MARGINEPUNCTELLA, STPH., IN SCOTLAND. William Evans. *Ent. Mo. Mag.* (2), vol. xi. p. 188 (August 1900).—Draws attention to a record of this species in the late Sir Thomas Moncrieffe's list of the Lepidoptera of Moncrieffe Hill, Perthshire ("Scottish Naturalist," vol. v. p. 24).

NEUROPTERA COLLECTED IN THE UPPER PORTION OF STRATHGLASS IN 1899. By James J. F. X. King, F.E.S. *Ent. Mo. Mag.* (2), vol. xi. pp. 181-185 (August 1900).—One hundred and eight species are recorded in this paper, taken between 15th June and 25th August of the year stated.

NEPA CINEREA, L., IN SCOTLAND. William Evans. *Ent. Mo. Mag.* (2), vol. xi. p. 188 (August 1900).—Several records are given for this species.

SOME NOTES ON THE BRITISH SPECIES OF THE GENUS NORELLIA. By Col. J. W. Yerbury, late R.E., F.Z.S. *Ent. Mo. Mag.* (2), vol. xi. pp. 199-202 (September 1900).—Scottish specimens are referred to in this paper.

BRITISH AMPHIPODA.—IV. FAMILIES STEGOCEPHALIDÆ TO CÉDICERIDÆ (part). By Canon Norman, M.A., D.C.L., etc. *Ann. Nat. Hist.* (7), vol. vi. pp. 32-51, plate iii. (July 1900).—Numerous Scottish localities are given for the various species.

BOTANY.

PLANT NOTES FROM SUTHERLAND AND CANTIRE. By C. E. Salmon. *Journ. Bot.*, 1900, pp. 299-303.—Contains a good many new records for the districts of East Sutherland, West Sutherland, and Cantire.

DRABA MURALIS, IN EDINBURGHSHIRE. By A. Craig Christie. *Journ. Bot.*, 1900, p. 279.—Notes its occurrence in Glen Farg and south of Edinburgh.

THE BOTANICAL EXCHANGE CLUB OF THE BRITISH ISLES: REPORT FOR 1898. By James Groves, F.L.S.—Mr. W. H. Beeby records that *Cerastium arcticum*, var. *Edmondstonii*, Beeby, brought from Unst in 1886, and grown, in Surrey, in soil from Unst, retained the dark purplish-copper foliage, but that seeds and plants brought from Unst in 1897 and 1898, and grown in a mixture of Surrey soils, had become green, thus losing the distinctive mark of the variety.

NEW AND RARE MOSSES FROM BEN LAWERS. By H. N. Dixon, M.A., F.L.S. *Journ. Bot.*, 1900, pp. 330-335.—Treats of occurrence and synonymy of several species.

THE EUROPEAN SPHAGNACEÆ (AFTER WARNSTORF). By E. Charles Horrell, F.L.S. *Journ. Bot.*, 1900, pp. 252-258, 303-315, 338-353.—Continues the enumeration, with descriptions of the species and varieties, and gives localities in Britain for each.

PELLIA NEESIANA, LIMPR., IN BRITAIN. By Symers M. Macvicar. *Journ. Bot.*, 1900, pp. 275-276.—Records the finding of this hepatic from three localities in Moidart, West Inverness; and gives the characters that distinguish it from the previously known British species.

NOTES ON FRESHWATER ALGÆ, II. By W. West, F.L.S., and G. S. West, B.A. *Journ. Bot.*, 1900, pp. 289-299, pl. 412.—Is an important paper on synonymy, with descriptions and figures of some new forms.

REVIEWS.

FLORA OF BOURNEMOUTH. By Edward F. Linton, M.A. Oxon.

This is the latest addition to the local floras of Britain, and it worthily sustains the standard of excellence exhibited by several of the floras in recent years. A good introduction indicates the limits and divisions of the district, its botanical characteristics in contrast to those of the neighbouring districts, and the local conditions that have led to the richness in species despite the absence of any considerable range in altitudes. The bulk of the book is naturally occupied with indications of the local distribution of the several species, and bears evidence of the thorough acquaintance of the author with the area in question. Bournemouth is a favourite resort both for health and for pleasure, and those visitors that desire to know the plants around Bournemouth; and to have an additional pleasure in their excursions, will find this book of much value, all the more because of its lightness and of the admirably clear type and the arrangement of its contents. By all interested in British botany it will be welcomed.

FIRST RECORDS OF BRITISH FLOWERING PLANTS. By William A. Clarke, F.L.S. (London: West, Newman, & Co., 1900.)

The value of Mr. Clarke's compilation of the earliest records of British Flowering Plants was appreciated by students of the flora during its publication as a series of papers in the "Journal of Botany" from 1892 to 1896, and its re-issue as a book was welcomed as a source of much information on the history of botanical research in Britain. The issue of a second edition has enabled the author to make corrections that have been found desirable and have been brought to his notice; and he has added throughout for the plants noted in the works of Ray and other early botanists the names (often phrases) by which they were known to these writers. These alterations add considerably to the value of the book, which we commend to our readers.

HANDBOOK OF PLANT COLLECTING. By J. M. B. Taylor. (Paisley, 1899.)

This pamphlet gives useful advice to those that wish to know how to collect, dry, mount, and preserve dried plants and such parts as fruits, seeds, stems, etc.; but typographical errors (of which there are a good many) may tend to mislead beginners unfamiliar with the terms. Mr. Taylor's personal experience shows itself in the practical nature of his remarks on methods and difficulties.

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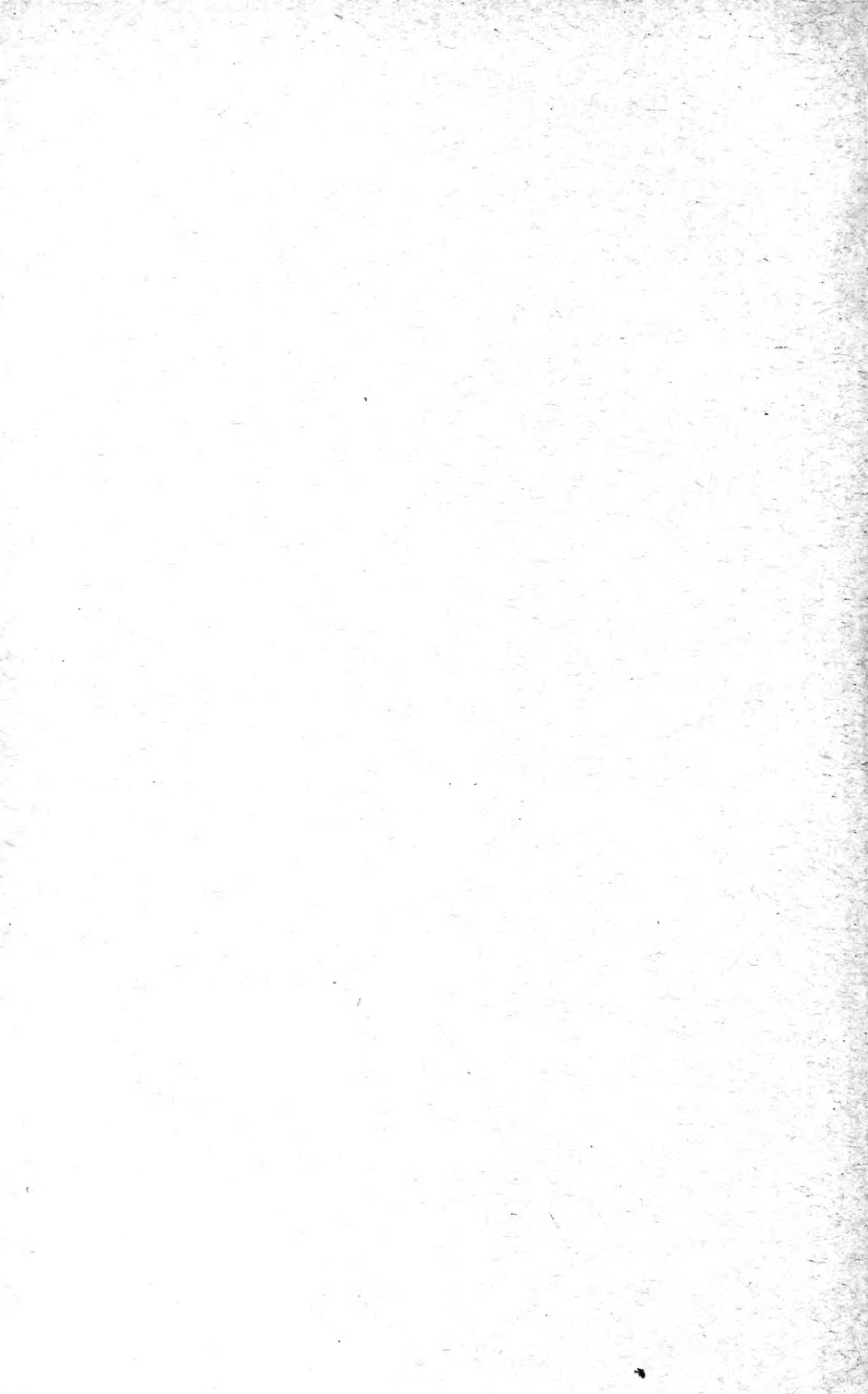
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